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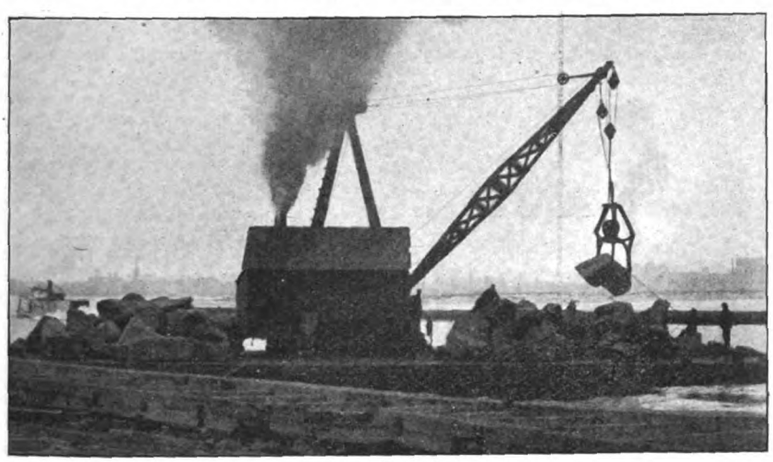
FLOATING DERRICK FOR HANDLING RIP RAP.

The process of handling large pieces of stone in the construction of enrockments, riprapping, etc., is not new, but it is usually carried on in open quarries, or along the shores of bodies of water, or in submarine work where the water is clear enough to give the operator a chance to see just what he is doing.



REVOLVING FLOATING DERRICK FOR HANDLING RIP RAP.

The work of removing the large riprap in the canal at Superior Entry, Wis., made necessary by the improvement of the same by the government, was inaugurated under peculiar conditions. The depth of the water over the riprap is from 5 to 20 ft. and the water is always opaque or muddy during the season of navigation. The only opportunity for performing the work when the water is clear is during the months from January to March, a time when the ice conditions prohibit the handling of floating plants such as tugs, scows, etc.

Doubt has been expressed by many of the practicability of removing this heavy riprap, under the above unfavorable conditions, by the use of grapples, tongs, hooks or similar devices, but an outfit has been built which is now doing the work in quite an economical manner. This rock handling machinery was designed and built by Mr. Clarence Coleman, M. Am. Soc. C. E., United States assistant engineer, and Mr. M. W. Lewis, United States junior engineer, under the direction of Major Chas. L. Potter, corps of engineers, U. S. A., until August 3, 1906, and since that date under the direction of Major Graham D. Fitch, corps of engineers, U. S. A.

Generally speaking, this outfit consists of a deck scow on which is placed, near its center, a revolving derrick. The general dimensions of the scow are as follows: Length, 102

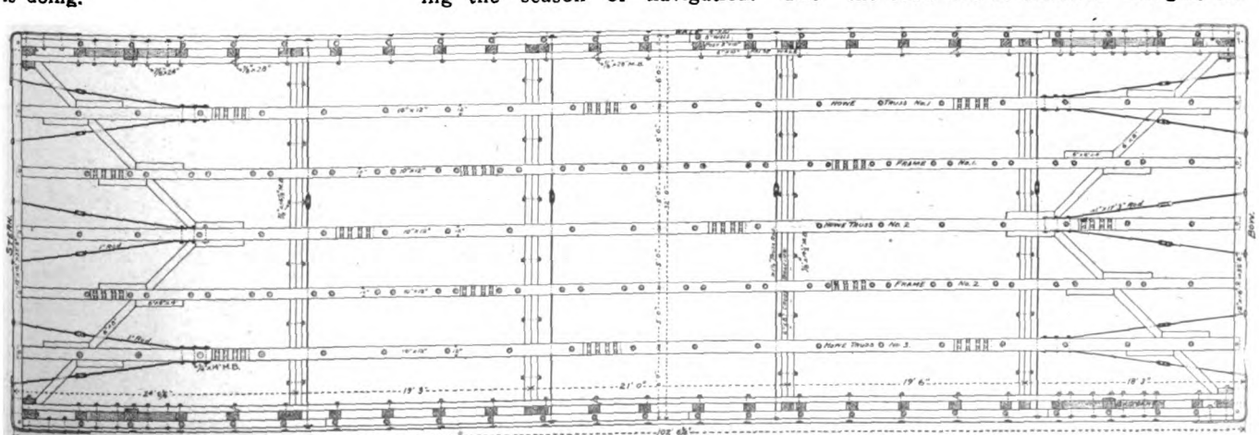


Fig. 1. Plan of scow showing walls, trusses, frames, etc. Scale: 1 in. = 4 feet.

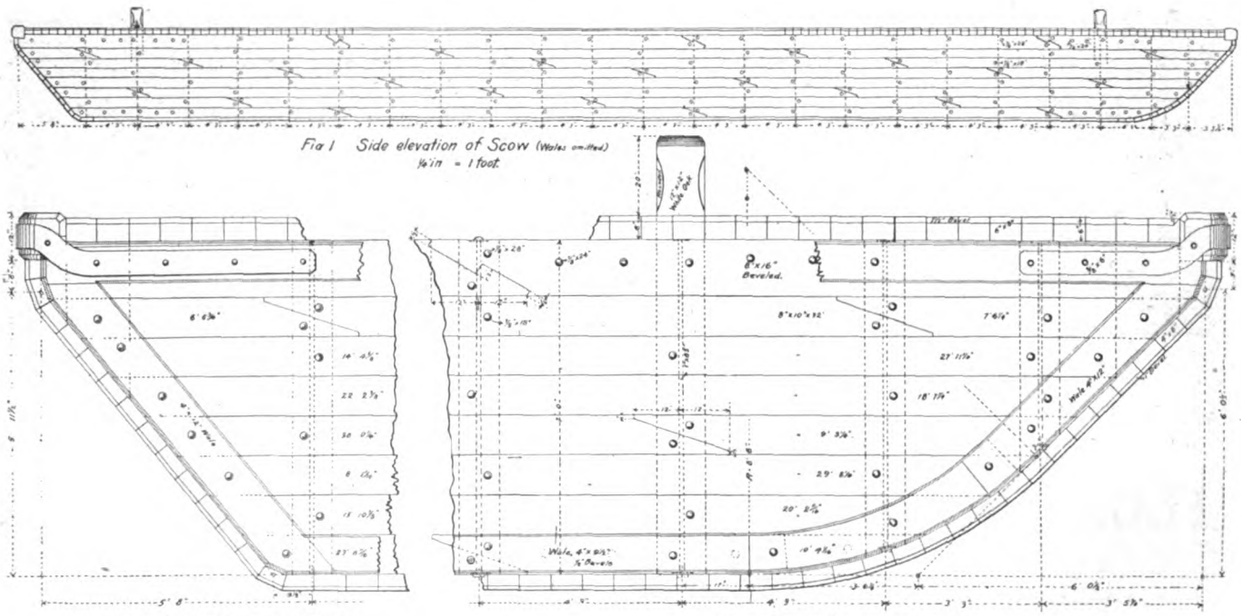
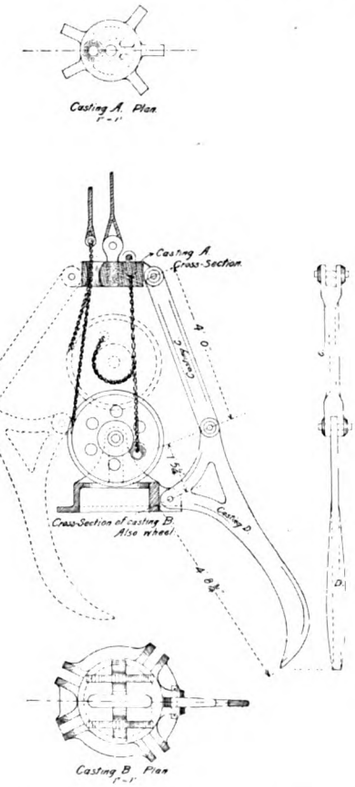


Fig 1 Side elevation of Scow (Walks omitted)
1/8 in = 1 foot.

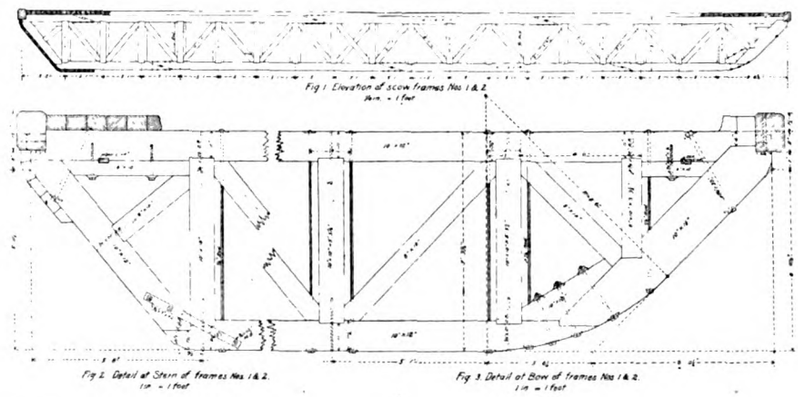
Fig. 2. Detail of side wall at stern.
1 in = 1 foot.

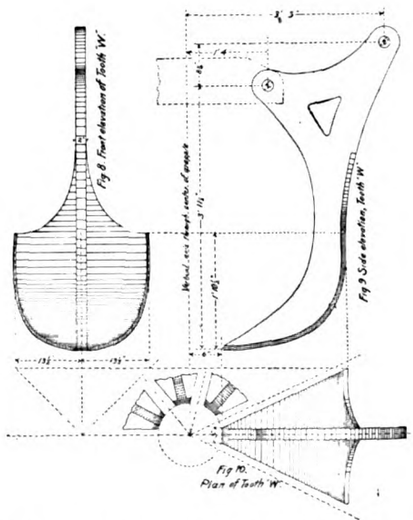
Fig 3 Detail of side wall at bow
1 in. = 1 foot

ft., width, 32 ft., depth, 8 ft. It is made up of a system of three Howe trusses and two common framed trusses, in addition to which are two side walls and four cross trusses, contributing to the stiffness of the scow. The vertical tie rods of the Howe trusses contain a turnbuckle which allows subsequent adjustment. Special hollow cast iron angle blocks were used in their design. A 6 in. deck of fir was laid to provide against falls of heavy pieces of rock. Near its center is placed a revolving steel platform mounted on sixteen conical wheels supported by a circular 60 lb. rail. All of the movable parts are securely fastened at the center casting to heavy cross beams inside the scow, so that the upward stresses which may occur on the center pin at times of heavy loads, are distributed directly to the top chords of the three central trusses.

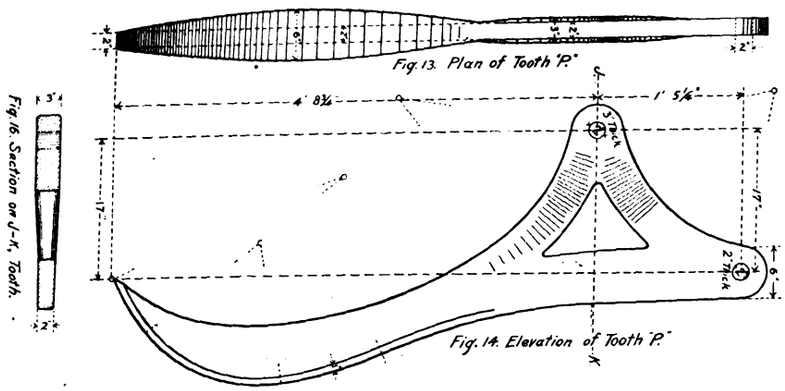


The revolving platform is constructed mainly of 10 in. 40 lb. I beams securely riveted. To support the head of the boom a double set of A-frames, constructed of 12 in. x 12 in. fir timbers 32 ft. long, is supported and securely fastened at points near the outer edge of the revolving steel platform, and converges above at a point directly over the center of the platform. This construction differs from the usual single A-frame at the front of the platform in that guys reaching astern, are provided bringing the top-lift near the center instead of at the front of the machine. The boom is





of the A pattern and is composed of two diamond trusses securely braced,



and reinforced at the head with stiffening plates.

The revolving circle is 20 ft. in diameter and turns on its axis easily. The detail drawings show the various parts and their relation to one another.

The boom is 40 ft. in length, 10 ft. in width at its base, and is supported on the front legs of the A-frame 5 ft. above the platform. The boom wire leads from the drum of the engine to the top of the A-frame, while the fall or grapple wires lead direct to the head of the boom.

The platform is revolved by a separate double cylinder drum engine, with wire ropes acting on the circumference of the lower track rail. The ends of the wire ropes are secured to the deck and framework of the scow, and have special car spring cushions. The swinging mechanism allows the boom to swing in either direction and to entirely cover either end of the scow. The boom will cover an area with a radius of from 14 to 48 ft., and the head has a maximum height of 48 ft.

Besides the weight of boiler and engine, coal, etc., a counterweight of 8 tons is carried on the stern of the revolving platform.

The machine has been constructed for the purpose of handling riprap up to 10 tons in weight. A grapple has been constructed which was designed especially for this kind of work, the main feature of which consists of five teeth arranged somewhat on the principle of the "orange peel" grapple, and for handling gravel, boulders and small rock, a seven tooth grapple has been constructed, having wide teeth to form its sides when closed.

All parts of these grapples, excepting the pins and chains, are made of cast steel.

The machinery is driven by a 30 H. P. steam engine with two cylinders 8½ x 10 in., and steam is furnished by a vertical boiler 42 in. in diameter and 8 ft. in height.

Working under ordinary conditions where the riprap is of various sizes ranging from one to ten tons, a uniform speed of from 40 to 60 tons per hour can easily be maintained.

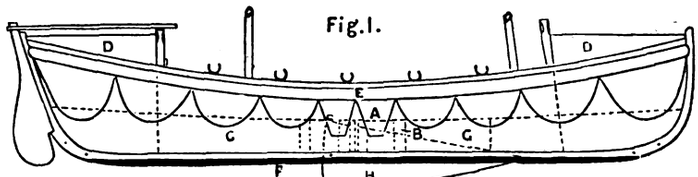
NEW TYPE OF LIFE BOAT.

In the accompanying diagram is illustrated a new life boat, the Forster Fawsett, which has just recently been built by the Thames Iron Works Shipbuilding & Engineering Co., Ltd., and placed upon the North Sunderland station, three miles distant from Bamburgh Castle, off the Northumbrian Coast. The boat, which is of the "self-righting" type, is 35 ft. long, 8 ft. 3 in. wide, rows 10 oars, and is fitted with one drop keel and two water-ballast tanks. Fig. 1 gives the profile or broadside view; Fig. 2, the plan or deck view; Fig. 3, the body plan, showing the form of transverse vertical sections at regular intervals in the length; and Fig. 4, the midship section.

The festooned lines on the Fig. 1 profile views represent outside lifelines for men in the water to catch hold. The blackened portion of the keel indicates iron keel ballast in distinction from water ballast carried in tanks or compartments provided in the holds for the purpose, and admitting of being taken in or pumped out at pleasure. Both iron and water ballast are variable and optional in the several boats built for the Royal National Life Boat Institution's stations, according to the varied circumstances and the desires of the coxswains and crews. It is of interest to note that water shipped on deck by seas breaking over the boat and otherwise is automatically freed through the holes in the deck and bottom of the boat, connected by large pipes termed relieving tubes, having valves called relieving valves, fitted at the deck, which pass water downwards and upwards. Enclosed compartments are automatically ventilated by specially-designed valves and pipes, while the majority of the boats have center boards or drop-keels of variable size and weight, which may be used when required, and which add materially to their weather qualities. It may be explained that A represents the deck; B, the relieving valves for the automatic discharge of water off the deck; C, the side air-cases above deck; D, the end air compartments, usually called end-boxes, an important factor in self-righting; E, the wale or fender; F, the iron keel ballast, important in general stability and self-righting; G, water-ballast tanks; and H, the drop keels.

SELF-RIGHTING TYPE.

Fig. 1.



PROFILE.

Fig. 2.

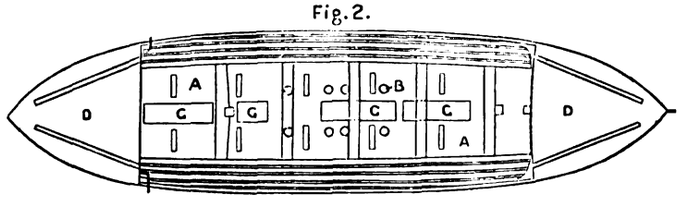
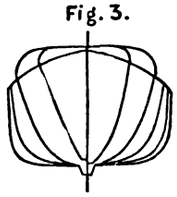
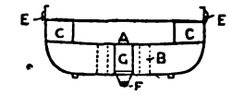


Fig. 3. DECK. PLAN.



BODY PLAN.

Fig. 4.



MIDSHIP SECTION.

Development of the Marine Steam Turbine.

BY THE HON. C. A. PARSONS AND R. J. WALKER.

During the last few years the steam turbine has formed the subject of many papers read before various leading institutions, and its different applications have often been referred to.

It is hardly within the scope of this paper to deal in detail with the earlier experiments and trials which have led up to the present satisfactory position of the turbine. It may be of interest, however, to briefly describe the various steps that have been made from time to time in the development of same.

In 1894 the first Parsons compound steam turbine engine was built and was applied to the driving of a dynamo. This engine was designed for 10 H. P., with a modified high-speed dynamo, and for a working speed of 18,000 revolutions per minute. It ran for some years, doing useful work, and is now in South Kensington museum.

Subsequently, efforts were made towards the construction of engines of larger sizes, which resulted, in the year 1888, in several turbo-alternators of 120 H. P. being supplied for the generation of current in electric light stations, and at that period the total H. P. of turbines at work reached in the aggregate about 4,000, all of which were of the parallel flow type and non-condensing.

In 1892 the steam turbine was first adapted to work in conjunction with a condenser. This engine was capable of developing 200 H. P at a speed of revolutions of 4,800 per minute, and drove an alternator of 150 kilowatt output. It was tested by Prof. Ewing, F. R. S., and the result of the test showed a consumption of steam of 27 lbs. per kilowatt hour, which is equivalent to about 16 lbs. per I. H. P., with steam moderately superheated and a vacuum of 28 in.

Since then various improvements have been made, until at the present time the steam turbine is generally recognized to be an efficient and practical engine, which, in the larger sizes, has attained a high degree of economy in steam.

The following table shows the advance made in sizes and increased economy in steam consumption as applied for electrical purposes:

Date.	Capacity kilowatts.	Steam per kilowatt hour, lbs.	Vac'm, inches.	Superheat Deg. F.	Steam pressure per sq. in., lbs.
1887	75	50	....	...	120
1892	100	27.00	27	50	...
1898	1250	18.81	28	180	130
1901	1000	17.30	27	198	150
1902	3000	14.74	27	235	138
1904	4000	15.40	28.7	150	200

Superheating of the steam has been adopted in the case of land turbines, and it has been found by experiments that for every ten degrees F. of superheat, the steam consumption is reduced by about one per cent.

Fig. 1, which is based upon a large number of tests, shows the steam consumption of different sized plants per kilowatt hour without superheating, from which it will be noted that the efficiency increases steadily as the size grows larger.

Turbine engines are also used for generating electrical current for the transmission of power, the working of electric tramways, railways, electric pumping, coaling and similar purposes. They are also used for coupling direct to and driving fans for producing forced and induced draft for general ventilating purposes; also for driving centrifugal and screw pumps, and also for the more important work of driving blowers for supplying air under pressure for blast furnaces and other purposes.

Land turbines have been very largely adopted in the past few years for the generating of electricity, judging from the fact that these machines are running in the power stations of some forty corporations and of twenty-five public electric supply companies. One of the largest power stations in England, now approaching completion, contains two units of 3,000 H. P. and six units of 6,000 H. P. each.

The total horsepower of turbines of the Parsons type delivered and on order, including turbines at work and under construction by licensees on the Continent and in the United States at the present time for land purposes is nearly 2,000,000 H. P. The installations now on order include units of upwards of 10,000 H. P.

The application of the steam turbine to the propulsion of ships has attracted a great deal of attention in the ship building world within the last few years.

It was not until the year 1894 that the idea of propelling a vessel by means of a steam turbine was put into practical form. The Turbinia, as is now generally known, was the first vessel to be fitted with turbine engines, and between the years 1894 and 1898 many experiments were made with the Turbinia, necessitating radical changes in the design and arrangement of the machinery. The first engine which was tried was the radial flow type, giving about 1,500 H. P. to a single screw. The results, however, were far from satisfactory, a speed of only 18 knots being obtained. Several different propellers were tested with this engine, and the results compared with the power registered by a dynamometer showed in every case a very low propeller efficiency. The original turbine engine was removed, and the engines finally adopted consisted of three turbines in series—high pressure, intermediate pressure, and low pressure—each driving a separate shaft, with three propellers on each shaft. A reversing turbine was coupled with the low pressure turbine to the central shaft. Very exhaustive trials were carried out by Prof. Ewing in 1897. A full account of these trials will be found in the "Transactions of the Institution of Naval Architects," Vol. XLV (1903).

Following the success of the Turbinia, the torpedo boat destroyers Viper and Cobra were built and fitted with turbine machinery for the royal navy, and achieved remarkable speeds, the Viper taking the position of being the fastest vessel in the world, having attained the phenomenal speed of 36.86 knots per hour. Unfortunately, however, the Viper ran on the rocks of the Channel islands in a fog, and ultimately became a total wreck. The Cobra foundered in a storm. Thus, after two or three years of hard work the Turbinia was the only vessel afloat fitted with turbine engines.

About this period very great difficulty was experienced in endeavoring to induce railway companies and owners of mercantile vessels to build a turbine boat. Each company appeared anxious that someone else should make the first experiment.

The marine turbine was first adopted for commercial purposes in the Clyde steamer King Edward to the order of Capt. Williamson in the summer of 1901. So successful was this vessel during the first season's running on the Clyde (the year of the great exhibition at Glasgow) that an order was placed for a second vessel, Queen Alexandra, and the performance of these two vessels running on the Firth of Clyde demonstrated the commercial advantages accruing from the adoption of the turbine system.

Other vessels quickly followed the King Edward and Queen Alexandra until there are at the present time 31 turbine vessels in service for commercial purposes, representing a total of

*Paper read before the Institute of Marine Engineers in London.

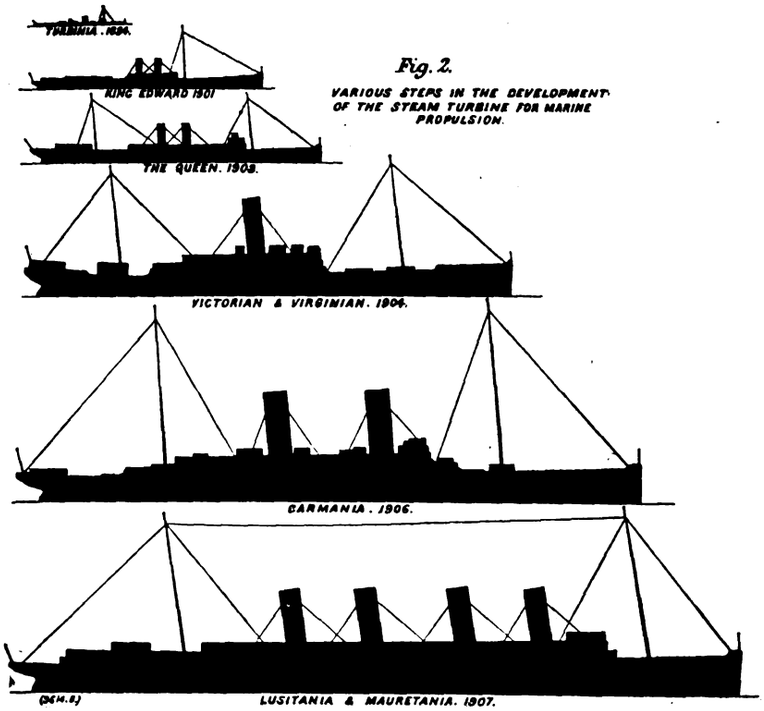


Fig. 2.
VARIOUS STEPS IN THE DEVELOPMENT OF THE STEAM TURBINE FOR MARINE PROPULSION.

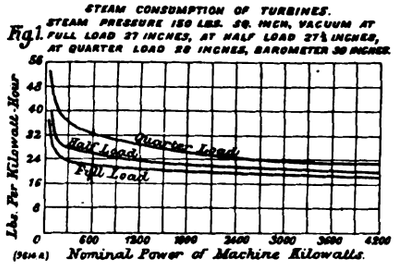
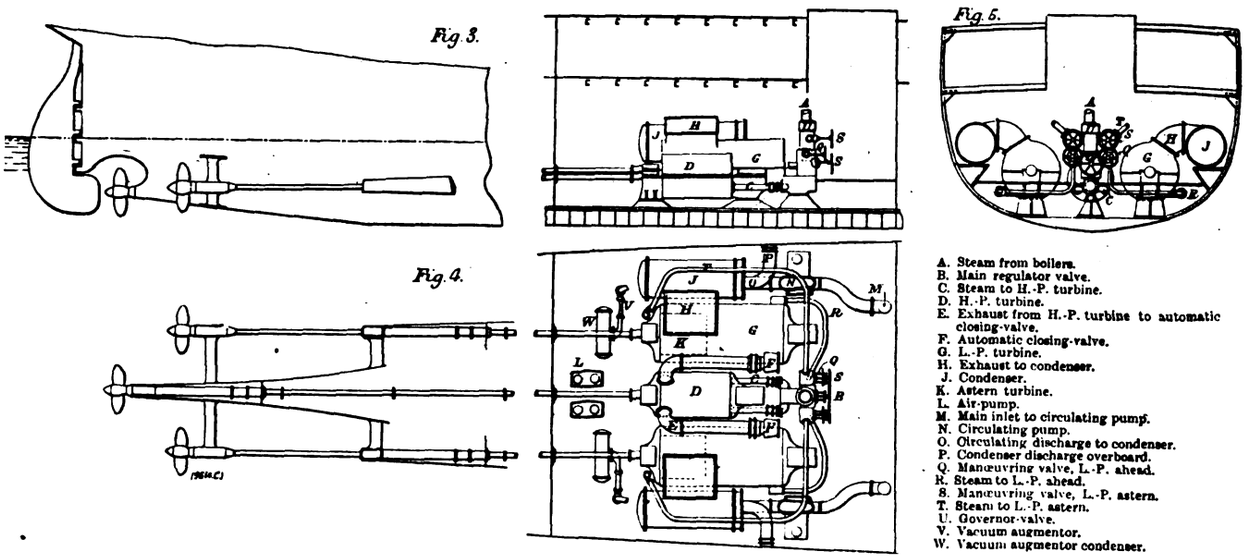


Fig. 1.



about 105,000 gross tonnage and 235,000 I. H. P.

The following table will perhaps best represent the various steps in the adoption of the turbine engine for commercial purposes:

Name of Vessel.	Owner.	Dimensions.	Gross Tonnage.	Approx. I. H. P.	Year built.
King Edward	Turbine Steamers, Ltd.	250 x 30 x 17¾	562	3,500	1901
The Queen	S. E. & Chatham Ry. Co.	310 x 40 x 25	1,676	7,500	1903
Virginian and Victorian	Messrs. J. & A. Allan	520 x 60 x 41	10,754	12,000	1904
Carmania	Cunard Steamship Co., Ltd.	678 x 72 x 52	19,524	21,000	1905
Lusitania and Mauretania	Cunard Steamship Co., Ltd.	785 x 88 x 60½	33,000 about	70,000	Now building

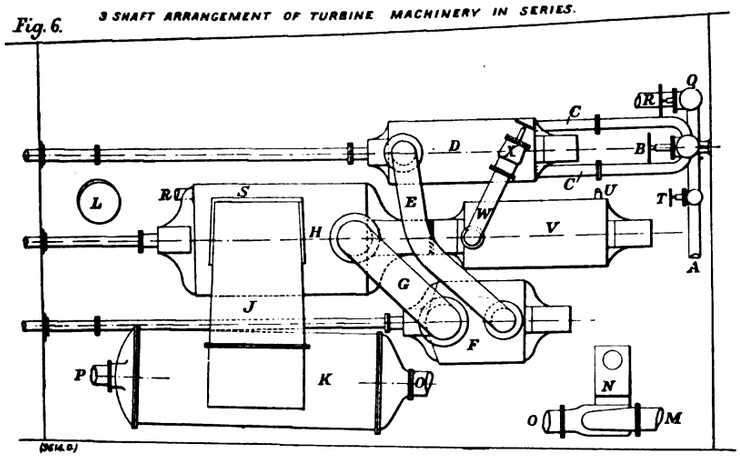
Fig. 2 shows, in a diagrammatic form, the comparative sizes of the various steps in marine propulsion. The profile of the vessels shown are to the same scale, beginning with the Turbinia of 100 ft. in length, 44 tons displacement, and 2,000 I. H. P., to the express Cunarders Lusitania and Mauretania, of 785 ft. length, 45,000 tons displacement, and 70,000 I. H. P. each.

As regards war vessels, the destroyers Velox and Eden were the next vessels following the Viper to be built for the British admiralty. These two vessels were fitted with additional engines for obtaining economical results when cruising at low speeds.

The next vessel to be fitted with turbines for the British admiralty was H. M. third-class cruiser Amethyst. This vessel was also fitted with cruising turbines, and the results of the trials as compared with sister vessels ordered at the same time as the Amethyst and of the same dimensions and lines, but fitted with reciprocating engines, demonstrated the economy of the Parsons marine turbine as fitted in this class of vessel, and more especially at the higher powers.

H. M. battleship Dreadnought is one of the latest war vessels to be fitted with turbine engines. This vessel's turbines which were manufactured by the Parsons Marine Steam Turbine Co., Ltd., at the Turbinia works, have now been installed, and the vessel is being prepared for trials. Particulars are given in the memorandum of the navy program of new construction of the various war

Fig. 6. 3 SHAFT ARRANGEMENT OF TURBINE MACHINERY IN SERIES.



A. Steam from boilers.
B. Main regulator valve.
C. Steam to H.-P. turbine.
D. H.-P. turbine.
E. Exhaust from H.-P. turbine to I.-P. turbine.
F. I.-P. turbine.
G. Exhaust from I.-P. turbine to L.-P. turbine.
H. L.-P. turbine.
J. Exhaust to condenser.
K. Condenser.
L. Air-pump.
M. Main inlet to circulating pump.
N. Circulating pump.
O. Circulating discharge to condenser.
P. Discharge overboard.
Q. Astern regulator valve.
R. Steam to astern turbine.
S. Astern turbine.
T. Cruising regulator-valve.
U. Steam to cruising turbine.
V. Cruising turbine.
W. Exhaust from cruising turbine to automatic closing-valve.
X. Automatic closing valve.

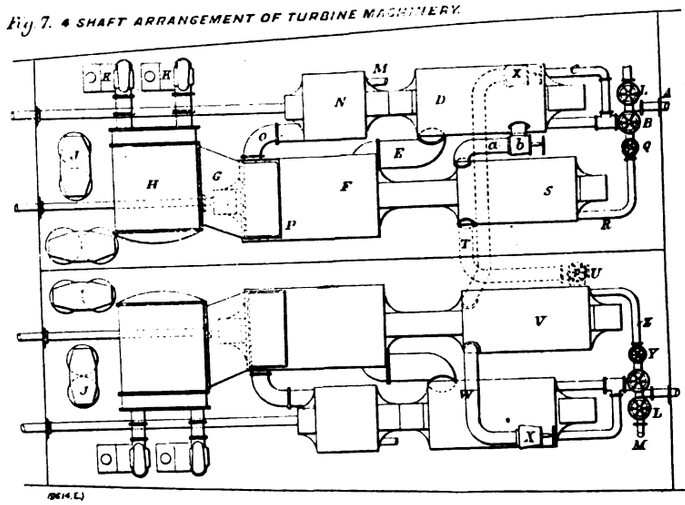
vessels which are at the present time being built, some of which are now nearing completion.

Comparisons of the earning powers of turbine vessels have been made from time to time with similar vessels on the same respective routes which have been found to be favorable to the turbine, and in some cases the saving in coal is very considerable.

A full account of these comparisons will be found in the "Transactions of the Institution of Civil Engineers;" "The Steam Turbine," by the Hon. C. A. Parsons and G. Stoney; and in the "Transactions of the Liverpool Engineering Society;" "Progress Made in the Application of the Parsons Turbine to Marine Propulsion" by R. J. Walker.

By the courtesy of Monsieur Pierrard, of the Belgian government, particulars are just to hand of the first season's running of the turbine steamer Princesse Elisabeth, on the Ostend and Dover service, and are given in the following table, along with the particulars of similar vessels on the same service but fitted with paddle engines:

Fig 7. 4 SHAFT ARRANGEMENT OF TURBINE MACHINERY.



A. Steam from boilers.
B. Main regulator valve.
C. Steam to H.-P. turbine.
D. H.-P. turbine.
E. Exhaust from H.-P. turbine to L.-P. turbine.
F. L.-P. turbine.
G. Exhaust to condenser.
H. Condenser.
J. Air-pumps.
K. Circulating pump.
L. Astern regulator valve.
M. Steam to H.-P. astern turbine.
N. H.-P. astern turbine.
O. Exhaust from H.-P. astern to L.-P. astern turbine.
P. L.-P. astern turbine.
Q. Regulator valve to H.-P. cruising turbine.
R. Steam to H.-P. cruising turbine.
S. H.-P. cruising turbine.
T. Exhaust from H.-P. cruising turbine to self-closing valve.
U. Self-closing valve.
V. L.-P. cruising turbine.
W. Exhaust from L.-P. cruising turbine to self-closing valve.
X. Self-closing valve.
Y. Direct steam-regulator valve to L.-P. cruising turbine.
Z. Direct steam to L.-P. cruising turbine.
a. Exhaust from H.-P. cruising turbine to self-closing valve when engine-rooms are independent.
b Self-closing valve.

	Princesse Elisabeth.	Princesse Clementine.	Marie Henriette.	Leopold II.
Length between perpendiculars	104m.85	103m.70	103m.70	103m.70
Breadth	12m.192	11m.58	11m.58	11m.58
Mean draught	2m.92	2m.85	2m.82	2m.82
Displacement in metric tons	2005	1853	1847	1829
Registered tons	1747Tx	1474Tx	1450Tx	1375Tx
Type of engines	Turbines	Compound	Compound	Compound
Speed on trial	24n.	22n.187	22n.2	22n.
Date of construction	1905	1896	1893	1893

In the year 1905 the mean consumption of coal per single trip and the mean time per trip from Ostend to Dover and vice versa of the four preceding vessels were as follows:

	P. E.	P. C.	M. H.	L. II.
Total number trips.	134	132	106	44
Mean dur. of trip.	185'2	210'5	206'4	202'4
Mean con. per trip.	22.71T	23.22T	24.27T	24.87T

For the first six months of the year 1906 the corresponding results were the following:

	Boat.	Steamers. Mean results
	Turbine	Paddle
Total number of trips	216	1070
Mean consumption per trip.	24.06T	24T
Mean duration of trip	185'9	215'4

From the above table it will be seen that the turbine boat does the passage in about 15 per cent less time than the paddle steamers on the same coal consumption. To reduce the turbine boat to the displacement and speed of the paddle boats, and assuming that the I. H. P. varies as the cube of the speed, the mean consumption of the Princesse Elisabeth would be about 17 tons, as against 24 tons in the paddle boats, thereby showing a saving of over 25 per cent.

The following mercantile vessels have been completed and placed on service this year:

The pleasure and mail steamer Rewa for the British India Steam Navigation Co., Ltd., of 455 ft. by 56 ft and 16½ knots speed; the new Clyde passenger steamer Duchess of Argyll for the Caledonian Steam Packet Co., of 250 ft. by 30 ft. beam and 20 knots speed; the Thames passenger steamer Kingfisher for the General Steam Navigation Co., 275 ft. by 32 ft. and 20 knots speed; the three cross-channel steamers for the Great Western Railway Co.'s new route, Fishguard to Rosslare, viz., St. David, St. Patrick and St. George, of 350 ft. by 41 ft. by 13 ft. 6 in. and 22½ knots

speed; the cross-channel steamer Viper for Messrs. G. & J. Burns, of 315 ft. by 39 ft. 6 in. by 13 ft. and 21¾ knots speed; and another Clyde passenger steamer, the Atalanta, for the Glasgow & Southwestern Railway Co., of 210 ft. by 27 ft. by 10 ft. 6 in. and 17½ knots speed. In addition to the above, the two Great Central railway steamers are nearing completion, and will, it is anticipated, be put in service this year, and

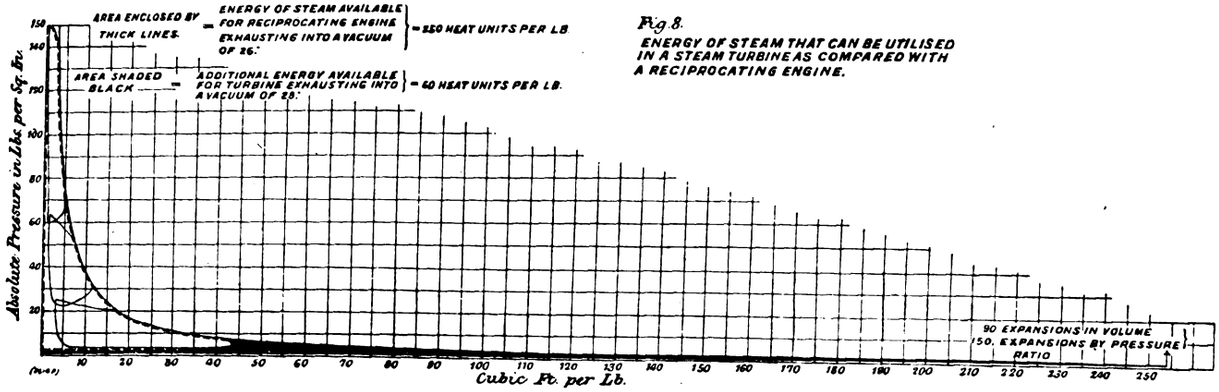


Fig. 8.
ENERGY OF STEAM THAT CAN BE UTILISED IN A STEAM TURBINE AS COMPARED WITH A RECIPROCATING ENGINE.

the yacht Mahroussa, which has been re-engined by Messrs A. & J. Inglis, has run her trials, when a speed of 17½ knots was attained.

In addition to the large number of war vessels that are now being built and fitted with turbine machinery by some eight of the Parsons Marine Co.'s licensees, and also in addition to the two express Cunarders by Messrs. J. Brown & Co., and Messrs. Swan, Hunter & Wigham Richardson, Ltd., and the Wallsend Slipway & Engineering Co., the following mercantile orders are in hand: Two large ocean-going liners by the Fairfield Ship Building & Engineering Co.; two cross-channel steamers for the South-eastern & Chatham railway, similar to the Onward and Invicta; and a further steamer for the Union Steamship Co., of New Zealand, by Messrs. Denny; two large sets of turbine engines for shipment to Japan, by the Turbine Co. at Wallsend; and the royal yacht, building by Messrs. Inglis, the turbine engines for which are being manufactured at the Turbinia works, Wallsend, representing a total I. H. P. of work in hand of about 590.000.

Although the turbine itself has been described in various publications which are now being issued, it may be of interest to some of the members to briefly describe the principle of the Parsons turbine, and to mention a few points incidental to the application of the turbine system to different classes of vessels.

In regard to the arrangement of turbines, this partly depends on the condition of service, and the various classes of vessels require, more or less, to be taken upon their own merits. The arrangement which has been almost universally adopted in the mercantile marine, is that of dividing the power equally over three shafts, viz., a high-pressure on the center shaft, exhausting into two low-pressure turbines, one on each side of the vessel. In such a case the high-pressure turbine is made suitable for an expansion ratio of about five, and the low-pressure for 25.

The turbines are of the parallel flow type, the general course of the steam through them being parallel to the axis.

Each turbine consists of a number of rings of blades or vanes mounted on a drum or rotor. This rotor is enclosed within a cylindrical case, upon which rings of blades are also fitted. The rings of blades are alternately fixed and moving, that is to say, the blades in the cylinder are stationary or guide blades, whilst the blades fitted on the drum are moving blades. The diameter of the drum is less than the cylindrical case, and thus an annulus is left between the two, which is occupied by the blades referred to. Steam issuing from the boilers flows through the first row of fixed or guide blades on the cylinder, it then in jets of moderate velocity, impinges on the moving blades, and imparts to them a rotary motion, this process being repeated on each successive ring of fixed and moving blades throughout the turbine.

As the steam passes from ring to ring it falls in pressure and increases in volume, and to meet this expansion the blades are increased in height by steps. The areas of the steam passages through the blades thus gradually increase from one end of the turbine to the other, to correspond to the expansion in volume of the steam for the range of pressures from beginning to the end of the turbine.

The turbine shaft is coupled to the propeller shafting and the thrust of the propeller is steam borne by the following arrangement:

Forward of the steam inlet a dummy piston is fitted of reduced diameter to that of the main drum. A large number of small grooves are turned in this dummy piston, into which fit corresponding fixed brass rings which are bedded into the dummy casing, forming steam baffles. The steam presses aft on the blades and on the annular part of the drum forming the step between the drum and the dummy piston, and the sum of these pressures balances the thrust of the propeller. To meet any unbalanced thrust such as is set up when steam is turned on or off suddenly, and to maintain the true longitudinal alignment of the rotors, a small thrust block is provided at the forward end of bearing. Where the turbine shaft passes through the casing, steam packed glands are fitted. These glands consist of a number of rings or strips arranged in series and designed to obtain a gradual rise or fall in pressure from the inner or steam end to the outer or atmospheric end of the gland. Valves are fitted to these glands to regulate the pressures and to ensure against leakage of air inwards. All the main bearings are under oil pressures, and the oil is discharged from the pump at a pressure of from 8 to 10 lbs. or at such a pressure as to ensure the efficient lubrication of all bearings.

In the exhaust casing of each of the low pressure turbines a reversing turbine is fitted.

By means of suitable valves, when maneuvering, the low-pressure and astern on each side of the vessel, are capable of being worked ahead or astern, as required, independently of the high-pressure turbine (the high-pressure turbine under such conditions running idly in a vacuum). By this arrangement, the vessel has all the maneuvering qualities of a twin screw vessel.

In torpedo boats, a similar arrangement is adopted as in the Turbinia, viz., three in series, with one astern on the center shaft only. This arrangement permits of a reduced weight being obtained, as compared with the high-pressure and two low-pressures in parallel for equal efficiency.

In very large powers, it is desirable to divide the power over four shafts, thereby increasing the revolutions and reducing the size of the units. The four-shaft arrangement lends itself well to large war vessels, as two complete sets of engines are obtained, viz., one high-pressure and one low-pressure, with condensing plant in each engine room. A two-shaft arrangement was adopted in the yacht Narcissus, which gave very good results; but for powers over 2,500 to 3,000 a two-shaft arrangement entails additional weight.

One of the chief difficulties which had to be contended with in applying the steam turbine to the propulsion of ships arose in connection with the propellers. It is desirable, for obvious reasons, that a turbine for a given efficiency should be designed to run at as high a rate of revolutions as possible, consistent with propeller efficiency. The speed of turbines for land purposes is considerably higher than is permissible for marine purposes where the speed of rotation is limited by considerations of propeller efficiency. The question of design of propeller and turbine dimensions requires to be considered independently, and also to arrive at the best compromise to meet the conditions required, i. e., as to weight, space, efficiency, and conditions of service. With a view of increasing the revolutions the diameters of the propellers and pitch ratios are less than is usual in the case of ordinary reciprocating engines, the smaller diameter of propeller necessitating higher ratios of blade surface to disk area than hitherto attempted with ordinary propellers.

In some of the earlier vessels multiple propellers were tried, but subsequent experiments showed that single propellers on each shaft were preferable. The loss of efficiency which has been observed in some of the vessels fitted with multiple propellers appears to have been due partly to interference from the forward screws and partly to cavitation.

Although more light might yet be thrown on the question of high speed propeller efficiency, a considerable amount of experience has now been obtained with turbine-driven propellers, which enables a close estimate to be made as to the efficiency which might be expected in a given design where reliable data as to horsepower necessary for the proposal in question can be obtained.

On account of the greater range of expansion dealt with in the turbine, as compared with the reciprocating engine, a good vacuum is much more essential in the former than in the latter, and because of the importance of a high vacuum with the steam turbine, careful consideration requires to be given to the condensing plant.

With a view of maintaining a high vacuum, a new apparatus has been introduced to assist the ordinary air pump and condenser, known as the "vacuum augmentor." The augmentor consists of a small steam jet placed in a contracted portion of a pipe led from the bottom of the condenser. The jet draws air from the condenser and delivers it to the air pump through a small auxiliary cooler. By this means the air is reduced to a negligible quantity.

The vacuum augmentor has now been fitted in several vessels with very good results.

As an illustration of the importance of high vacuum, Fig. 8 shows the energy of steam that can be utilized in a steam turbine as compared with a reciprocating engine.

Another point which has often been referred to in connection with turbine machinery, is the question of boiler pressure. The effect of difference of boiler pressure between 150 pounds to 200 pounds is relatively smaller with turbines than with reciprocating engines, and it is very questionable, in the majority of cases, whether the saving in coal by the adoption of high boiler pressure would justify the increase. More especially is this the case in moderate speed vessels. In moderate speed vessels, to obtain reasonable propeller efficiency, a certain diameter of propeller is necessary, and the revolutions to correspond are moderately low. It is necessary to obtain a certain surface speed of turbine, as well as a certain number of rows of turbine blades, to obtain reasonable economy. The diameter of the turbine, therefore, becomes greater in proportion to the power, and the blade heights in the annulus between the drum and the casing are relatively shorter; this gives a relatively greater clearance loss.

The clearance area is practically constant for a given diameter, so that with higher pressures and denser steam the loss through clearance space will be greater.

Another point which has been greatly discussed in connection with turbine machinery is the question of the method of measuring the horsepower developed by the turbine engines. As is now more or less generally known, it is not possible to indicate the power of the turbine as in the ordinary method of the indicator diagram of reciprocating engines, and in the absence of any such method, it is found most convenient to take the estimated I. H. P. as the equivalent indicated horsepower which would be required with reciprocating engines for the particular class of vessel proposed. Messrs. W. Denny & Bros. have recently introduced a new dynamometer or torsion meter for obtaining the power transmitted by the shaft, the readings being obtained by the torsional deflection of a given calibrated length of the main shafting. This instrument has been used on several vessels, and appears to give very reliable results, and where facilities are at hand for obtaining the effective horsepower by means of tank experiments, the shaft horsepower, together with the effective horsepower, form a very good basis for estimating propeller efficiency.

Other advantages incidental to the turbine might be cited, such as reduced weight of machinery, steadiness and smoothness of running, reduction in oil and stores, and absence of racing in a seaway, and other advantages which have brought the turbine to a commercial success.

The development of the marine turbine has taken place almost entirely in Great Britain. A few war vessels have been built in France and Germany. The reason that the Parsons marine turbine has made so little progress on the continent in the past is probably due to the fact that in France and Germany rival turbine systems of local origin have been energetically exploited, inducing those responsible for the ordering of new vessels to defer the adoption of a new system until the claimants had results to show.

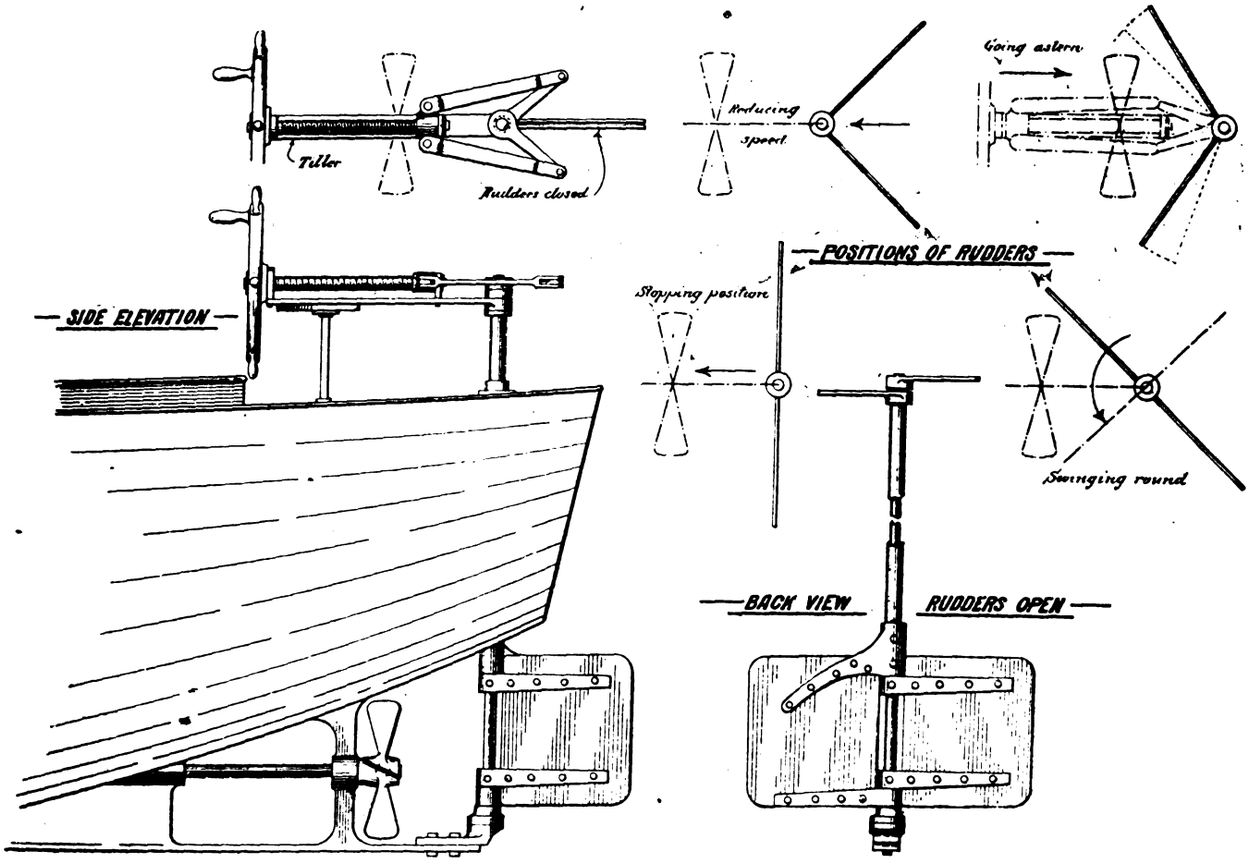
The Parsons turbine was introduced to the continent by the small French torpedo boat No. 293. This boat, ordered by the French navy as an experiment in the year 1903, has been in continual service for over two years without any breakdown or repair, and continues to give in practice the results obtained on trial. Naturally, so small a boat hardly demonstrates the results which might be expected from larger installations. The above mentioned experimental torpedo boat is 130 ft. x 14 ft. beam and 95 tons displacement. She attained a speed of 26.2 knots. The arrangement of machinery is similar to that in the Turbinia, viz., three turbines in series.

In France a mail and passenger boat is being built for the Marseilles and Algiers service of the Compagnie Generale Trans-Atlantique. She is 378 ft. x 43 ft., and is designed for a service speed of 20 knots.

In the States five passenger vessels are being built, and a scout cruiser of 24 knots speed for the U. S. A. government, to be fitted with Parsons turbines.

A COMBINED DOUBLE RUDDER AND STEERING GEAR.

Our representative in Britain has just had an opportunity of inspecting a patent double rudder and steering gear which has been invented by M. Smethurst, Manoi Park, London. It consists of two rudders, so arranged that when they are closed they form, to all intents and purposes, an ordinary single rudder, cases a slightly different arrangement has to be adopted, similar to that already described in the principle and differing only in details. The two wheels, the one for steering and the one for opening and closing the blades, are placed one in front of the other. If the rudder wheel is turned a double pulley turns also and draws in or lets out, as the case may be, an endless rope. This brings the two boat is reversed. Trials that have already been made amply bear out all that has been claimed for this invention. The boat on which this combined rudder has been fixed was brought to a standstill in one-third the distance when the blades were open as compared with the boat going at the same speed when they were closed, thus establishing a very effective break to the boat. In maneuvering the



SMETHURST'S PATENT RUDDER AND CONTROLLING GEAR AS FITTED TO THE LAUNCH SMETHURST IN THE WEST INDIA DOCKS, LONDON.

and can be operated as such. But for maneuvering purposes—and it is here that the utility of his rudder is emphasized—the double rudder can be opened out into the position as shown in our illustrations. When in this or any intermediate position the twin rudder can still be controlled in the ordinary manner by means of a tiller.

The device consists of two rudder blades, one attached firmly to the tube, the other to an ordinary spindle which passes through the tube. The spindle and wheel form the tiller. The wheel is turned to open out or close the blades. The desired amount of opening of the blades having been attained, the wheel is no longer turned, steering being effected in the usual manner as with a tiller, and as already mentioned, the spindle and wheel act as such. In boats of large size it is invariably necessary to steer from the forward end and not aft. In such rudder blades together or vice versa. The ends of the rope are fastened to the bottom of a pendulum, the movement of which is regulated by the steering wheel. As the pendulum is moved the rope on one side is let out as much as it is drawn in on the other side, and this causes steering to be effected in the usual way. An indicator is placed near the wheel, which shows at a glance the exact amount of opening of the two rudder blades. The makers claim many advantages for this rudder, the most important being the ease with which a boat may be controlled by its use. It is also claimed that a boat may be turned around in its own length, and that putting the rudder hard over does not cause the boat to "beam." Further, it is claimed that by opening the rudder the speed of the boat may be gradually decreased until when they are fully open the boat is stopped, and that by still further opening them the boat has been further made to practically swing around as if on a pivot with the blades open and the helm put half over. The inventor further claims that the greater the power of the engine, the more quickly the boat will turn. This may be said to be true up to the limit where the force exerted by the propeller is greater than the resistance of the rudder.

The Canadian Pacific Co. has awarded a contract in England for a new 10,000-ton freighter to be employed in the carrying trade of the north from Victoria and Vancouver. This new vessel will be about the size of the Princess Beatrice, but with much larger freight accommodations. The construction of this new freighter is to begin shortly. She will be a steel hull and will be modern in build and equipment to the last degree.

"In The Merchant Service."

Michael Clancy heaved a deep sign of contentment as he stretched himself lazily on his bunk. Lulled by the easy roll of the ship he was just dropping off to sleep, the smoke curling upward with the fitful puffing at his pipe, and as he puffed he ruminated.

"Well, so we're away again for another three weeks, biddin' good-bye to the New York cops, the boardin' saloons, an' our last month's pay, an' I'll not be sorry when we get settled down to work.

"It's always a hard day, sailin' day, what between comin' aboard with your little load, wantin' a sleep, workin' fires badly needin' clinkerin', with no appetite for your grub, an' all the other troubles.

"But this day has been a day of surprises to me, an' I suppose it will be some time before the strangeness of it all wears off.

"In the first place, this new hooker is altogether different from what I have been used to on the old herrin' pond, from the old tramp with a nose like the end of a factory, punchin' half of the Atlantic along in front of her, to the 'ocean greyhound' with her 'every modern improvement,' bless her. Her every modern improvements stop right at the head of the fo'castle ladder.

"Well, now, an' if it wasn't for Cassidy I'd still be on one or the other of them, but he coaxed me to sign on here with him, an' she certainly is a surprisin' ship to me. Take the bunks, for instance, here; the number of your berth is handed to you on comin' aboard to muster sailin' mornin', the last man aboard get-

"SCRAMBLIN' AFT—IN DIRTY WEATHER, TOO."

tin' the dark, draughty bunk in the alleyway, which is only right. None of the old game of the little wee man gettin' dragged from one bunk after another till all the big fellows are satisfied, an' mighty glad if he didn't get hurt in the handlin'.

"Talkin' of the dark bunk; heavens, all of the bunks were more or less in the dark in those fo'castles, with their two electric lamps lightin' a room holdin' near fifty men, an' one or the other of them lamps nearly always busted.

"But in this fine ship, now, you can lie an' read in your bunk, an' them that can't read can look at the pictures in the mission books, anyhow, for there is plenty of light on every side of you.

"Then, again, in the other old packets there was always the good old scramble for your grub when the kids were brought down the fo'castle, every man grabbin' for his bit, or someone else's. That was certainly the fine sport, but damned poor sport for the man that got left.

"Here we have a dinin' room, every man gettin' his whack dished out to him, big and little fellows alike, an' them that are wolves have plenty left over in the kids to scramble for.

"An' didn't old Cassidy laugh—darn him—when I started aft along the deck with my clothes, wet with sweat after comin' off watch, lookin' for a safe spot on the gratin's down in the boiler rooms, some place where they'd dry without accumulatin' too much ashes an' sut.

"Who'd think that after all them years they've started purvidin' dryin' rooms for the wet clothes of the 'man behind,' instead of havin' him scramblin' aft in his shirt and pants—in dirty weather, too—to fetch his workin' duds from the boiler tops. That current of hot air does the job all right, an' *that's* no *hot air*.

"Then again, think of the roomy washhouses with their gratin's on the floor an' their tiltin' basins, not to speak of the lightin' of the place an' the heatin' arrangements. When I think of the other old derelicts, where we washed off at the end of the watch, standin' on a slippery deck holdin' a bucket between our feet, an' leanin' against one another to keep ourselves from slidin' into the scuppers when she rolled, I can't thank Cassidy enough. I've struck a home.

"An' the idea of the recreatin' room on the spar deck is all right, too, an' a Christian act on the part of some naval architect or another.

"In heavy weather, when she is takin' them over the head with the decks awash, a man can get up there an' have his peaceful draw of the pipe, instead of us all being cooped down below like so many hens keepin' in out of the rain, all smokin' an' spittin' an' cursin' like longshoremen on pay day, an' not a blessed wink of sleep can one of you get for the racket of the others.

"To come back to the beds again, why couldn't them other lines provide a Christian bed for a man, an' show some decency, instead of throwin' the old 'donkey's breakfast' in your bunk with no pillow nor nothin', in case you might be in danger of gettin' too comfortable, an' lettin' you keep warm as best you know how?

"Now, there is some comfort in a bed like this, an' Heaven be with them in the other old hookers this dreary night."

"Now then, Clancy, shake a leg," Cassidy was calling from the form where he was sitting pulling on his shoes. "The watch was called long ago, an' you're

lying there smilin' to yerself like a two-year-old, an' you with your clo'es to fetch yet!"

Michael clambered sleepily from his bunk where the iron straps were already working their way up through the "breakfast" into his ribs and started aft along the wet and wind-swept deck to the "safe spot on the gratin's," and, as he dodged the flyin' clouds of spray and realized that it was all a dream, curses low and deep were wafted forth on the cold midnight air of the stormy North Atlantic. "THE STAND-BY MAN."

THE MAN AT THE WHEEL.

A DIALOGUE.

BY JAMES ROSSAN.

Scene—A dingy, little office in the Board of Trade building at Chicago. In gilt letters on the window are the words "The Reliable Steamship Co." The walls are hung with pictures of steamboats and various marine scenes; prominent among which is one of a steamer and a schooner in collision. A low railing runs across the room forming an outer and inner compartment.

The manager, a venerable, gray-bearded old man, is seated at a desk in the inner compartment. Capt. Lemuel Saunders and Capt. John McCurdy, two sturdy, heavy-bearded seamen of about sixty years, are seated in large chairs in the outer compartment, their feet elevated to the top of the railing. The hands of the clock point to four p. m., and the dusk of the short autumn days is already gathering. Outside a gale is raging, and the three men are sitting staring at one another in silence as the dismal shrieks of the wind penetrates the walls.

Saunders rises, walks to the manager's desk, extracts a box of smoking tobacco from one of the drawers, and hands it to McCurdy.

Saunders—Here you are, Mac. Fill her up.

McCurdy (after filling and lighting his pipe, and loud enough so the manager can hear him)—I wonder if he has made up his mind yet which one of us to take?

The Manager—No, Mac; not yet. Captain of the Magnolia is a snug berth with good pay. I am very particular about getting a good man. The passenger trade is getting heavier every year, and that adds to the responsibility. Since Gordon died the matter of getting good captains has bothered me considerable.

Saunders (seating himself, placing his feet on the railing and addressing McCurdy)—Well, if it's a good man he wants I guess he'll have to take one of us two, alright, eh, Mac?

The Manager—McDonald is looking for it. (After which he turns to his desk and starts to work.)

Saunders—Queer cuss, that McDonald! (The manager is absorbed in his work, and apparently does not hear.)

McCurdy—Why, damn him! He couldn't pilot a washtub across the Chicago river in broad daylight.

Saunders—Guess we don't have to sidestep for any upstarts, eh?

McCurdy—Never could understand that cuss. Let's see; he was wheelsman for old Capt. Gordon something like twenty years, if my reckoning is right. Ever get acquainted with him Lem?

Saunders—Good Lord, yes! Went to school with him in Canada. He is is a good many years younger than me though.

McCurdy—That was somewhere near Collingwood, eh?

Saunders—Yes. At that time Gordon was sailing the Orion, and ran to Collingwood regular. The whole population of the place used to turn out to witness the arrival of the big boat. Gordon, as master of the packet, was about the biggest thing around; I doubt if the premier of the Dominion would have received more honors than he did.

McCurdy (rubbing his hands in evident self-satisfaction)—Great thing to be a captain, Lem; something like a king or an emperor, you know.

Saunders—Yes, I guess that's why Gordon got the girl. (The manager moves closer to the railing, and holds a newspaper in front of him.)

McCurdy—What girl?

Saunders—Jeanette Baptist.

McCurdy—Who was she?

Saunders—If you'd been around Collingwood in your younger days, Mac, you wouldn't ask who Jeanette was. A figure as trim as a Lehigh valley liner, and as sprightly as a triple-expansion under two hundred pounds of steam. Few of us them days who didn't carry a list Jeanette's way. Canadian French, you know, with those big black eyes that look at you like a friendly harbor-light on a stormy night.

McCurdy—Young, too?

Saunders—About McDonald's age. And, blame me, if we didn't all think he had her shipped. But one spring he went north with me, as wheelsman in the Farragut. We worked in the north channel all summer, towing logs up around the French river. In the fall, when we got back, Capt. Gordon had shipped Jeanette for a life voyage and taken her to Chicago.

McCurdy—Did McDonald take it hard.

Saunders—Oh, no. Old Baptist, her dad, was a sensible sort of a chap. He explained it to him, how she'd be better off with the captain, even if he was a matter of thirty years older. Fine clothes—fine house—husband, a captain and all that, you know.

McCurdy—Well, well, so Mrs. Gordon was Jeanette Baptist. We had an appeal for assistance from her at the last meeting of the Shipmaster's Association. It seems old Gordon didn't leave much when he dropped off last fall; and the children, I hear, are as thick as rats on a fruit packet.

Saunders (knocking the ashes from his pipe, and leaning back in a ruminating mood)—Let me see now, it was the year after he was married that Gordon had the collision on the bay. The schooner's jibboom raked him off the bridge, and he was hurt pretty badly around the head. He had six months in the hospital and then he went back in the Orion again; and that's when McDonald first shipped with him.

McCurdy—Right you are, Lem. The next year I shipped as mate with Gordon. He was then in the Pioneer, peddling along the west shore, and running through to the lower lakes with his passengers. McDonald was wheelsman, and there was something about the cuss that I didn't like. He was not on my watch; and, of course, as long as the captain was satisfied—we carried no second mates in those boats—it was none of my business.

Saunders—Was he stubborn like?

McCurdy—Well, yes,—something like that. You see, we were going down the St. Clair river. It was one of those hazy, dirty nights when it takes about all the grit a fellow's got to run that narrow, crooked channel. Capt. Gordon didn't feel like hooking her up because business was rushing, and the old man (with a nod towards the manager) was aboard, and was sitting forward of the pilot house peering into the haze ahead. Well, after coming off watch and getting my pipe lit, I took a stroll forward. There was Capt. Gordon on the bridge, very busy, of course, piloting his boat. Now and then he sang out an order to the man at the wheel: "Starboard! Hard over! Steady as you go!" and so on, the same as any man would. Next I took a squint inside of the wheelhouse. There was me bold buckoe answering as nice as you please, "Starboard, Sir, Hard over, Sir! Steady, as you go, Sir!" and, believe me, Lem, as true as I am sitting in this chair, never moving the wheel according to an order.

Saunders—What!

McCurdy—Never budging the wheel

when ordered, Lem; just moving it to please himself. Now let me tell you, if a man should ever attempt to disobey my orders to the wheel, I'd break every bone in that particular man's body.

Saunders—Great cyclones, yes!

McCurdy—Somehow, he managed to keep her in the channel alright, and we didn't hit any of the upbound boats. But let me tell you if the old man hadn't been aboard there would have been another man needed at the wheel. As it was, on relieving the watch, I tapped the captain on the shoulder and said: "A word with you, sir?" Now, Lem, you know what sort of a man Gordon was when he was angry. Why, after telling him what I had seen, I expected to see a dead Canuck floating in the river. But, by the holy Mackinac! he just looks at me kinder soft and sheepish like, and says: "It's alright, Mr. Mate. McDonald ain't a bad fellow."

Saunders—H—m—m, that is queer.

McCurdy—A couple of years later I shipped with Gordon again. That spring we were delayed in fitting out. Well, sir, by orders from headquarters McDonald was transferred to one of the other boats in the line that was ready to leave. I was, of course, half tickled to death. I thought I was bloody-well rid of the cuss. But, blame me, if he didn't get sick just before that other boat sailed, and he got well again in time to catch us going out.

Saunders—Couldn't get rid of him no way, eh?

McCurdy—That fall the old man (with another nod towards the manager) comes along, and says in that dignified way of his'n; says he:

"Mr. McDonald, you have been with us a long time now. You better try for a license. We will need a few mates in the spring."

"Don't want no license," says McDonald.

"Mr. McDonald," says the old man, sharp like; "a man who has not ambition enough to look for promotion, we do not want in our employ."

Saunders (taking his feet off the railing, facing McCurdy and laughing boisterously)—And try it he did. By God, Mac! it was about the funniest thing I ever saw. I was taking an examination at the same time. The inspector read his papers aloud. There was something about the compass having three hundred and sixty-five cardinal points, and the principal one being the zenith. The Chicago pier-light he described as a floating dark-lantern, and located it eight hundred and sixty-five miles north of Duluth.

"H—m—m," said the old inspector. "T'would take you a long time to find home, my boy. But, come here, I'll see what you know about the rules of the road." There was a scared look on McDonald's face, which I thought was on account of the mess he had made of it; but I hardly believe that now.

"You are meeting another boat in a narrow channel," says the inspector. "By one blast of his whistle the pilot has signified his intention of passing you to starboard. You have answered him with one blast; but suddenly he changes his mind and blows you two blasts, signifying his intention of taking the other side. Now what would you do?" That confounded blockhead sat for quite a while apparently in a brown study, while we all held our breath expecting something to happen.

"Well, well," says the inspector, and I could see him getting warm around the collar. "Remember you are getting close together and something will have to be done in a hurry."

"Why, damn him!" McDonald blurted out, "I'd run into the frog-eater, and sink him for changing his mind!" Just back of the inspector stood a bronze statue of Atlas, or whatever you call that fellew who carries the whole world on his shoulders. Well, the old fellow grabbed his atlas-ship by the leg, and it was a lucky thing for McDonald that he had reached the door before the inspector let fly.

McCurdy—Damn queer cuss, that!

Saunders—Seems as if he didn't want 'em, eh Mac? Passed with the highest honors this time, you know. They say he made the inspector admit that he, himself, didn't know the first rudiments of navigation.

McCurdy—Queer cuss! that's all I can say. Last summer I shipped with Gordon again. Poor berth in that old packet, but a man has to do something, you know. I had just had that bad luck with the Arabian, and was glad to get anything. Say, Lem, did you ever notice what a powerful lot a flock of kids can eat, especially when you are out of a job? Well, there was that cuss of a McDonald still at the wheel. It was getting on towards fall, and we were packed with tourists from the east on their way home; some of them slept among the freight. McDonald had been complaining for some time about not feeling well. I, with an eye to getting rid of the lubber, advised him to go to the hospital.

"Oh, he'll be alright in a day or two," says Capt. Gordon.

"Alright, sir," says I, and then I added, "if you are determined to carry him, it is none of my business." Well, by the time we reached lake Erie he was worse. In the evening, while taking my stroll forward, I heard a commotion in the wheelhouse. There he was on the floor. The fever had him. And, Lem, I hope to never pull another bell, if the captain wasn't trying to stand him on his feet, and telling me that h'd be alright again in a minute.

Saunders—Great Scott, Mac! You don't suppose—?

McCurdy—I don't suppose anything, Lem. It had gone as far as I could stand it. I had the sick man carried aft; and put a deckhand, who said he had had some experience, at the wheel. Somehow, I couldn't go to sleep that watch, something was bothering me. When we left Chicago the youngest of my kids was down with the scarlet fever. It seemed as if I could hear the little fellow crying for me to walk the floor with him. At ten o'clock I gave up the attempt to sleep, lit my pipe and took a walk on deck. And, Lem, there I saw a sight which I hope never to see again as long as I live. Across our bow, not over five hundred feet ahead lay a big steel collier; and the Pioneer was going full tilt, dead smack into her red light. Capt. Gordon was walking up and down the bridge as unconcerned as if there wasn't another boat within a hundred miles of us. "God Almighty, man!" I shouted at him. Then to the man at the wheel: "Hard a starboard, you son of a sea-cook!" I guess the engineers must have thought the old boy himself had got into the engine room signals the way I worked them.

(The manager moves uneasy in his chair, and takes his handkerchief from his pocket.)

Saunders—My God, Mac! I believe it now, you've heard—?

McCurdy—I've heard nothing, I was right there, and it was the narrowest escape I ever had. But, we were lucky, we lost nothing except a few fenders and a coat of paint on the starboard side. Now, Lem, I'm a man who knows the value of proper respect for your superior officer; but, let me tell you, when Capt. Gordon came down from the bridge, I felt like saying a few things. But you ought to have seen him. He was as pale as a ghost, and his knees shook like a sheet gone adrift in a gale. "Mr. McCurdy," he said in a trembling voice, "will you please take her for a spell; this thing has gone too far; there are too many lives aboard." He staggered to his cabin like a drunken man, and I heard him muttering

something about the woman and the children. Now wasn't that queer, Lem?

Saunders—No, sir, nothing queer about it! It's as plain as a course on a chart.

(Outside the gale has increased, and a heavy gust rattles the doors and windows. The manager wipes his eyes with his handkerchief, lays down the paper for an instant, and glances nervously at the clock.

McCurdy—Of course, you've heard how it happened, Lem. He was in the habit of taking that stuff that makes you go to sleep—laudanum, I guess they call it. And by mistake he took an overdose; at least, that is what the coroner's jury said.

Saunders (rising and grasping McCurdy's arm with vehemence)—The corner's jury are a lot of damned fools, Mac! We are all damned fools! My, what a night this is outside! And look, it's pitch dark! Come on, let's go home. We don't want this job.

McCurdy (rising slowly and buttoning his coat)—Well, the whole business seems damned queer to me.

Saunders (pulling McCurdy towards the door, and speaking in a subdued voice)—Mac, did you never hear that story about the Canadian doctor who claimed that since the collision on the bay, twenty years ago, Capt. Gordon couldn't see a distance of a hundred feet from his face?

McCurdy—Heard it, why, of course, I have. But, good God, Lem! You don't—Why, who the devil—Oh, yes, I see. (A heavy wind gust shakes the whole building.) My, what a night! Let's go home, Lem! We don't want this job.

Saunders—Great God, Mac! Once I called that doctor "a damned liar." Come on, let's go home.

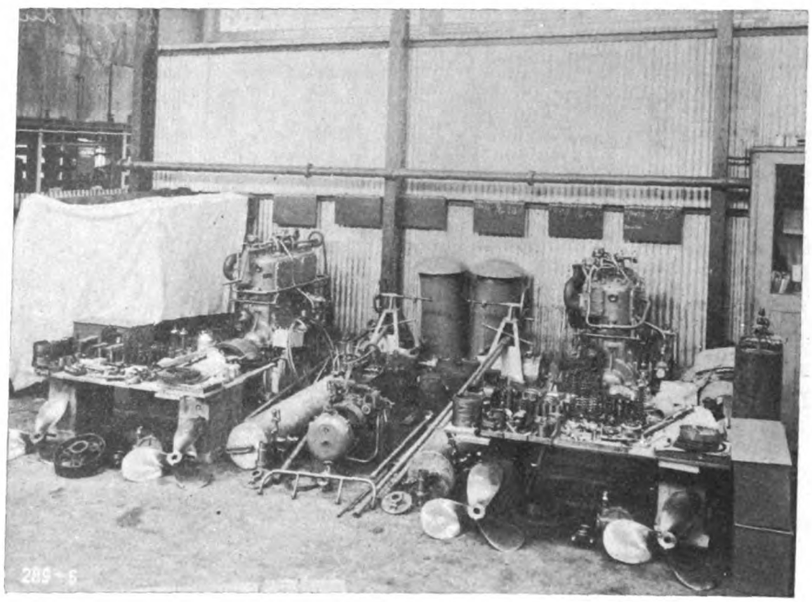
The Manager (going to the telephone and placing the receiver to his ear)—Hello! That you McDonald?—Yes,—I have decided about that now, and want you to go out as captain of the Magnolia. What's that? No. Going to get married? Who? Mrs. Gordon! Oh, yes! Soon as the wedding is over. Alright, Mr. McDonald, I'll hold the job for you; you can depend on that! Good bye.

(Curtain).

The steel tug Edward D. Reynolds was launched on Jan. 17 from the yard of John H. Dialogue & Son, Camden, N. J. The tug is 115 ft. long, 23½ ft. beam and 13 ft. deep. Her engine is 13, 21 and 32 by 24 in., of 1,150 nominal horsepower, steam to be supplied by a Scotch boiler.

TWO COMPLETE MARINE SETS.

The accompanying photograph illustrates two complete marine sets, recently supplied by John I. Thornycroft & Co. to the Indian government under the supervision of their consulting engineer, Sir E. J. Reed. These engines are to be fitted into two vessels for the Bombay customs preventive service. It will be noticed that a very full supply of spares has been ordered, including two spare propellers. The engines are of the Standard D.4 type, giving 100 H. P. at 750 R. P. M., when using petrol as fuel. They are fitted with mechanically operated inlet and exhaust valves, forced lubrication, double ignition, viz., low tension magneto and high tension electric with accumulators, and have aluminum crank cases.



TWO COMPLETE MARINE SETS.

The engine on the left is started by hand, and that on the right is equipped for starting by compressed air. In the center is a Thornycroft single cylinder, 6 H. P. motor, direct-coupled to an air compressor.

Although these two engines have been supplied to run on petrol only, similar engines can, when fitted with a suitable vaporizer, be run on paraffine of up to 150 degrees flash point.

AROUND CAPE HORN WITH ROBERTS' WATER TUBES

The steamers Iroquois and Chippewa, which were built six and seven years ago, respectively, by the Craig Ship Building Co., of Toledo, O., for service on the great lakes, where they have been in operation ever since, have recently been purchased by the Puget Sound Day Line to run from Seattle to points in the neighborhood of Vancouver. These two steamships arrived in New York harbor a few weeks ago and have since been overhauling and refitting for salt water service. They have installed evaporators, surface condensers in place of jet condensers, feed regulators, and given the boilers, engines and auxiliaries a general overhauling preparatory to their long trip at sea.

The Chippewa is 206 ft. long, 34 ft. beam, 21 ft. 6 in. moulded depth, and is driven by four standard No. 16 Roberts boilers, containing, approximately, 224 sq. ft. of grate surface and about 6,700 sq. ft. of heating surface, supplying steam to one triple-expansion engine having cylinders 20, 32½ and 55 in. in diameter, with a common stroke of 30 in., developing about 2,000 H. P. under natural draught conditions. The Iroquois, while differing slightly in minor details, is practically the sister ship. These boats have considerable speed. Either one can easily make twenty miles an hour.

These two vessels have come from the head of the Lakes by way of the Gulf of St. Lawrence and are now about to proceed to Puget Sound around Cape Horn, the entire trip comprising nearly 25,000 miles.

After they have completed this wonderful voyage, which will outdo the famous trip of the battleship Oregon during the Spanish war, considering that these steamers are even smaller than the gunboat Marietta, which accompanied the Oregon, and providing they report ready for service at destination, which we fully expect them to do, it will hardly be possible thereafter for any one to claim that screwed joint Roberts water-tube boilers are not suitable for sea service.

THE MARINE REVIEW

DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

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February 7, 1907.

SENATOR JACOB H. GALLINGER

In its current issue the MARINE REVIEW begins a series of original portraits of Americans distinguished in shipping and its allied industries. The purpose is to present these men in the habit as they live, and to that end the series will represent them as they go about their daily business. It has been thought fitting to begin the series with the portrait of Senator Jacob H. Gallinger of New Hampshire, the foremost figure in the fight for the recognition by the government of the rights of American shipping on the high seas. The portrait was taken in his committee room in the senate chamber. Senator Gallinger has been a consistent advocate of the extension of the protective policy to shipping since he entered public life. He was the chairman of the Merchant Marine Commission, composed of five senators and five representatives, which made a tour of the country in the summer of 1904 for the purpose of inquiring into the necessity for the extension of governmental aid to American shipping engaged in the foreign trade. The mass of invaluable data which this commission collected was due to the energy with which Senator Gallinger conducted the investigation. Testimony was taken on the Atlantic and Pacific coasts, on the great lakes, and on the gulf. No one can read the three volumes in which this testimony is published without being convinced that the sole hope of American shipping oversea is the granting of compensating advantages to surmount the artificial handicaps placed upon it by our fiscal policy.

Senator Gallinger was born on a farm in Cornwall, Ont., March 28, 1837, being one of twelve children. He received a common school and academic education and was a printer in early life. He studied medicine and was graduated with honors in 1858. Following the profession of medicine and surgery at Concord, N. H., from April, 1862, until he entered congress, having a practice which extended far beyond the limits of his state. During his career as a physician he was connected with various medical societies and was a frequent contributor to medical literature. He was a member of the house of representatives of New Hampshire in 1872, 1873 and 1891. He was a member of the state senate in 1878, 1879 and 1880. He was chairman of the Republican state committee from 1882 to 1890, when he resigned that place, but was elected to the position in 1898, being re-elected in 1900, 1902 and 1904. At the Republican National Convention of 1888 he made the speech seconding the nomination of Benjamin Harrison. He was chairman of the New Hampshire delegation to the Republican National Convention at Philadelphia which renominated President McKinley, and again headed the delegation to the national convention in June, 1904. He was elected to the forty-ninth and fiftieth congresses, but declined renomination to the fifty-first congress. He succeeded Henry W. Blair as United States senator and took his seat March 4, 1891. He was re-elected in 1897 by the unanimous vote of the Republican members of the legislature and the votes of five Democratic members. He was re-elected in 1903, the first time in the history of the state that anyone has been elected as United States senator for three terms. On this occasion he obtained the unanimous vote of the Republicans and the votes of three Democrats.

REPAIRS AT SEA.

With the various engineering papers and magazines giving accounts, from time to time, of breakdowns at sea, the reader ashore "gathers in" the knowledge, in peace and comfort, that the engineers at work on the breakdowns acquired at the cost of many hours' loss of sleep, many hours of starvation, and many hours of anxiety.

Sometimes these accounts will be accompanied by diagrams of the engine rooms with illustrations of the breakdowns and the methods of repair. Seldom, if ever, do we hear of the various ways and means attempted, the ways and means which, somehow or another, didn't work. These the engineer seldom mentions, beyond speaking of them regretfully as so much time lost and so much labor wasted. Why this should be the case only the engineers themselves know, as it often happens that the repairs which were first attempted were the outcome of some clever thinking and though ineffectual in this particular case, might have been a perfectly satisfactory repair under other circumstances.

An engineer, sitting for his second-class Board of Trade certificate in London, some years ago, was asked by one of the examiners how he would undertake the repairs in the case of a breakdown temporarily disabling his ship. The type of breakdown, of course, was given.

In examinations of this kind, breakdowns and repairs are one of the main features, the engineer giving an account of his experiences, breakdowns and difficulties, and methods adopted to repair or overcome the latter. This usually leads to a searching inquiry (part of the "verbal" examination) on the causes of the breakdowns and difficulties, and why these particular methods were adopted. In addition to this, the engineer is supposed to be able to give a satisfactory account of the steps he would take to meet any difficulty which might arise. This, to say the least, is a large propo-

sition, as the difficulties which might arise are many. It is usually the unexpected, also, that happens.

To return to our engineer. The details of the breakdown having been given, he described how he would make the repairs, illustrating his remarks with a rough pencil sketch, the ability to make a rough "working" sketch being also a necessity at this examination. His repair was a quick and substantial job, but far from neat and artistic. It was not, also, the inspector's particular method, the engineer being no diplomat. The inspector listened attentively to the description, but with rather a deprecating air, and said:

"Yes, your method is fair, very fair indeed, but don't you think that this"—(hurriedly sketching on the pad his pet theory)—"would be a much superior method, even if it took more time?"

The engineer looked closely at the inspector's sketch, then said, "Yes, that is certainly a much superior job, and would be all right 'out east,' where you have the same weather for months at a stretch, but on the North Atlantic, where I put in my time, you are never sure of the weather two hours at a stretch, so we have to do a repair in a hurry."

There are so many points to consider in repairing a disabled set of machinery, the distance to port, the stresses and strains to which the repairing will be subjected, the likelihood of encountering heavy weather, etc. What would not be suitable in one case might be suitable in another.

Therefore, accompanying the description of the repairs that were successful, let us have a description of those that ought to have been, but were'nt.

SUBMARINE SOUND SIGNALS RECOMMENDED.

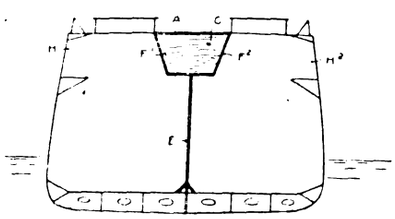
The committee of captains appointed to make recommendations for the safety of navigation has been made a permanent affair and will be known as the Lake Carriers' Auxiliary Committee on Aids to Navigation. Capt. John Lowe of the Pittsburg Steamship Co.'s fleet is chairman, and George A. Marr, secretary of the Lake Carriers' Association, is secretary.

One of the most important recommendations that the committee has made is that of advocating the installation of submarine sound signals at several important turning points on the lakes, namely, Southeast shoal, Lake Erie; Detour, Lake Huron; Thunder bay island, Lake Huron; off Crisp point, Lake Superior; Devil island, Lake Superior; Point Betsy, Lake Michigan; South Chicago, Lake Michigan; Poe's reef, straits of Mackinaw, Lake Michigan.

Mr. Harry Coulby, president and general manager of the Pittsburg Steamship Co., has advised the Submarine Signal Co. of Boston to send an expert to Cleveland with a view of equipping a number of its steamers with submarine signaling apparatus. It has not yet been determined what steamers will be so equipped, but the business will be speedily closed after the representative arrives. It is probable also that the Cleveland-Cliffs Iron Co. will adopt the system on some of its vessels.

NEW IDEA IN BULKHEADS.

M. W. Aisbitt and J. W. Shotton, 47 Mount Stuart Square, Cardiff, have recently taken out a patent dealing with bulkheads, tanks and compartments of a cargo vessel. The description is best understood by reference to the diagram printed herewith. Below the main deck of the vessel the space is divided by a



vertical longitudinal bulkhead E and between the main deck and upper deck A the space is divided by two longitudinal bulkheads F^1 and F^2 including a compartment G. The sides F^1 and F^2 are preferably sloped together near the bottom. The wing spaces H^1 H^2 are in communication with the lower portion of the hold, being specially adapted for grain cargoes. The compartment G may be used for ballast, cargo or passengers. The entire structure, it is claimed, forms an efficient longitudinal girder.

GRAND LODGE SHIP-MASTERS' ASSOCIATION.

At the annual convention of the Grand Lodge of the Ship-Masters' Association at Toledo last week the following officers were elected: Grand President, M. G. McIntosh, Detroit; grand vice president, Anton Christensen of Milwaukee; grand secretary, E. G. Ashley of Toledo; grand treasurer, A. J. McKay of Detroit.

Among the important aids to navigation recommended was the establishment of a light-house with necessary signals three miles off Milwaukee harbor. A resolution was also adopted recommending the establishment of a retirement fund for the crews of life-saving stations.

AROUND THE GREAT LAKES.

The convention of the grand lodge of the Ship Masters' Association will be held in Milwaukee next year.

President Harry Coulby of the Pittsburg Steamship Co., will leave for England next week, for a brief vacation.

The steamer Robert Fulton of the Pittsburg Steamship Co.'s fleet is at No. 1 dry dock at Cleveland for repairs to her stern bearing.

Capt. Thomas Burns, who was mate with the late Capt. Joseph Power on the steamer G. J. Grammer last year, has been appointed master of the steamer.

The bulk freighter building at the Cleveland yard of the American Ship Building Co. for Pickands, Mather & Co. will be named in honor of the late Jay C. Morse, who was a member of the firm.

The keel for the bulk freighter, Milinokett, building for James Davidson and H. L. Shaw of Bay City, has been laid at the Ecorse yard of the Great Lakes Engineering Works in the berth vacated by the launching of the steamer Thomas F. Cole.

The bulk freighter under construction at the Ecorse yard of the Great Lakes Engineering Works for Pickands, Mather & Co. of Cleveland will be named in honor of D. O. Mills of New York, who is interested in the Lackawanna Steel Co. of Buffalo.

Judge Swan of the United States district court at Detroit has decided in favor of the Ball Brothers in the Lynn-Ball Brothers collision in St. Clair Flats Ship Canal in 1905. The libel against the Lynn was for $5,000 and the Pittsburg Company has filed a cross-claim for $7,000.

The Schlitz Brewing Co., Milwaukee, has closed contracts for electric hoisting machinery for its coal dock on Commercial street. The new dock will be 440 ft. long, 180 ft. wide, with a handling capacity of 100,000 tons of coal. The apparatus will enable it to unload the largest cargo in thirty-six hours.

The package freighters Scranton and Lackawanna have been chartered by the Anchor Line for the season of 1907. The Lackawanna and Scranton were purchased by the Buffalo Transit Co. from J. J. McWilliams last fall. The Lackawanna went on the breakwater at Cleveland, but was completely repaired in dry docks at Cleveland.

The underwriters have rejected the bids for raising the steamers Hurlburt W. Smith and Wm. Nottingham which were blown ashore in the storm at Buffalo. Capt. Harris W. Baker of Detroit bid $63,000 and the Reid Wrecking Co. of Sarnia $59,000. Capt. Baker states that there is only 12 in. of water on the lake side of the two boats and that it will be necessary to put ways under them and dredge a cut 1,000 ft. long.

Annual Meeting Marine Engineers' Beneficial Association.

The National Marine Engineers' Beneficial Association held their thirty-second annual convention at the Ebbitt House, Washington, D. C., from Jan. 21 to Jan. 26. There were 129 representatives in session, and much work was done, the report of the various committees showing the organization to be in a highly satisfactory condition.

On Wednesday the officers to serve for the ensuing year were elected as follows: W. F. Yates, New York, president; Wm. J. Brady Jr., San Francisco, first vice president; J. R. Blanchette, Buffalo, second vice president; George A. Grubb, Chicago, secretary; A. L. Jones, Detroit, treasurer; W. B. Blaicher, of Buffalo, F. J. Houghton of New York, and Wm. Sheffer of Baltimore being elected members of the advisory committee.

During the week the National Marine Engineers' Supplymen, who were also in session at the Ebbitt House, entertained the marine engineers from time to time, a theater party on Monday evening and smoker on Thursday being two of the leading features.

On Friday several photographic groups were taken of the delegates and friends, officers and supplymen, after which an opportunity was afforded of meeting President Roosevelt at the White House.

The president in a few fitting remarks expressed his pleasure in meeting the party, congratulating the Marine Engineers' Beneficial Association on its good standing and the accomplishments of the marine engineer in the world of commerce, after which he received each member of the party individually.

On Wednesday evening several of the party went to Baltimore, accepting the general invitation of the M. E. B. A. No. 5 to their annual ball and social, having a very pleasant time and returning to Washington in the small hours.

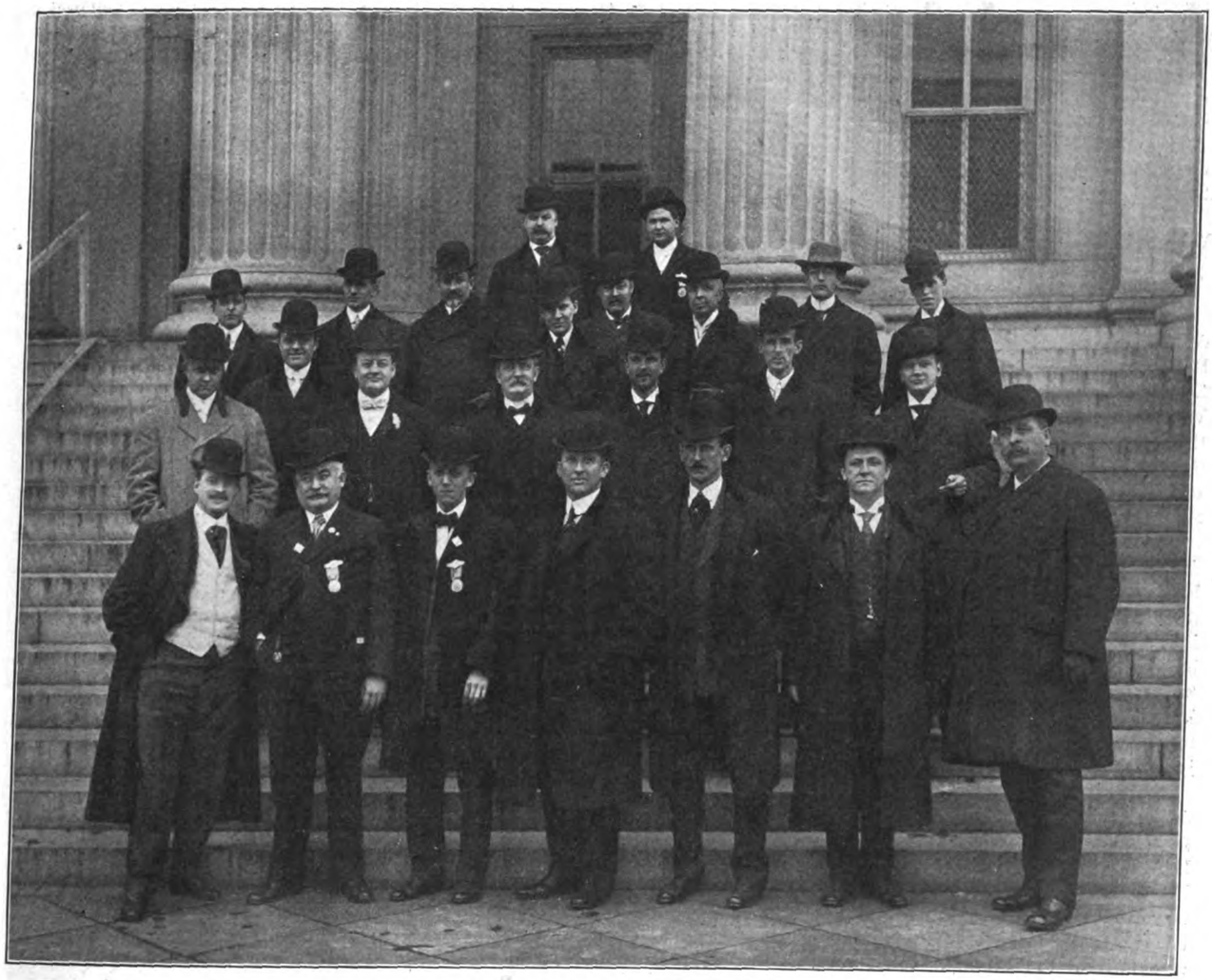
The social event of the week was the smoker given at the New Willard Hotel on Thursday evening. Besides the marine engineers and friends, the delegates to the Masters and Pilots' Association, also in session at Washington, were among the audience, as were also many government officials, including representatives of the navy department.

The entertainment was in the form of a minstrel show, the performers all being members of the Bay Ridge Athletic Club of New York, arriving from that city on Thursday specially for this event.

Much new and highly amusing business was run off between the songs, the end men seeming to have been singularly well chosen. There was also a noticeable absence of the usual threadbare gags of the professional minstrels. The program, which held the interest of the audience for a good three hours, contained the following sentimental and humorous songs:

Opening chorus, M. E. B. A. Madrigal,

THE NATIONAL MARINE ENGINEERS' BENEFICIAL ASSOCIATION IN SESSION AT WASHINGTON, D. C. NO. 1 IS PRESIDENT W. F. YATES, OF NEW YORK. NO. 2 IS SECRETARY GEORGE A. GRUBB, OF CHICAGO.



GROUP PICTURE OF NATIONAL MARINE ENGINEERS' SUPPLYMEN.

end song, "Moses Andrew Jackson, Good-bye," Joseph McKenna; tenor song, "Love Me and the World is Mine," Frank J. Corbett; end song, "Bill Simmons," John Forsman; baritone solo, "Bonnie Jean," Herbert Self; quartet, "Annie Laurie," New York Male Quartet; end song, "He's a Cousin of Mine," William Murray; tenor solo. "I'm Only Living for You," William Redmond; end song, "He Walked Right In, Turned Around, and Walked Right Out Again," John W. Armour. C. Southard Thompson entertained the company at the close of the minstrel show with "The Gambler's Story," in which he explained the trickery of the gambling sharp by deft manipulation of the cards. A series of moving pictures finished what was a most enjoyable evening. The accompanist of the evening was Henry Frantzen.

During the intermissions liquid and combustible souvenirs were distributed amongst the audience.

Supervising Inspector General George Uhler was among the guests of the evening, as were also Captains Birmingham, Cotter, Cumbah, Dunn, Dorsey, Harris, Sloan, Stone, Oast and Westcott, of the Board of Inspectors; O. H. Tittman, superintendent of the coast survey; Capt. John Ross, Capt. Putrizzi, and Capt. Graves, also of the coast survey; Admiral Rogers, U. S. N.; Capt. Worth G. Ross, chief of the revenue cutter service; C. A. McCallister, chief engineer of the revenue cutter service; Admiral C. W. Rae, chief engineer of the navy; S. I. Kimball, superintendent of the life-saving service; Frank P. Sargent, commissioner of immigration; A. F. Statter, James B. Reynolds, and J. H. Edwards, assistant secretaries of the treasury; R. J. Tracewell, controller; L. P. Mitchell, assistant controller; Representatives Allan of Maine, Fordney and McMorran of Michigan, Wilson of Illinois, and Minor of Wisconsin; John Callahan, president, and George Preston, secretary of the International Association of Machinists; Frank Morrison, secretary, and James O'Connell, third vice president of the American Federation of Labor; and Capt. J. H. Poole, superintendent of the State, War and Navy Building.

The entertainment committee consisted of Chas. W. Martin, of Jenkins Bros.; J. L. McGilvray, of the Peerless Rubber Mfg. Co.; Harry N. Bennett, of the Bird-Archer Co.; F. R. Low and John W. Armour, of *Power*; Louis L. Bernier, of the James Reilly Repair & Supply Co.; William Schmidt Jr., of the Lunkenheimer Co.; Harry J. Marks and Allan W. Marks, of the Empire State Engineering Co.; Herbert Self and A. K. Waycott, of the Crandall Packing Co.; Herbert E. Stone, of the Chapman Valve Co.; Hudson Dickerman, of Morgan & Wright; George H. Orton and L. W. Griggs, of the Standard Oil Co.; H. S. Demerest and F. A. Ransley, of Green, Tweed & Co.; William B. McVicker, of the Dearborn Drug & Chemical Works; George C. Penboss, of the Revere Rubber Co.; H. H. Howard, of the Howard Chemical Co.; Frank J. Corbett, of the Ashton Valve Co.; S. Inglis Leslie and J. J. Cizek, of the Leslie Co ; George W. Knowlton and Thomas Gale, of the George W. Knowlton Rubber Co.; N. S.

Kenney, of the Philip Carev Mfg. Co.; A. R. Foley, of the Home Rubber Co.; D. E. Lynn, of the National Lead Co.; B. B. Franklin, of the Garlock Packing Co.; Chas. I. Felthousen and Carl Hunt, of the *American Marine Engineer*; John Lloyd Wilson, of the Swan-Finch Co., and A. Ross Mackay, of THE MARINE REVIEW.

MARINE ENGINEERS' BENEFICIAL ASSOCIATION ELECTIONS.

Lodge No. 1, Buffalo, N. Y.: President, Fred. Hale; vice president, John Rainey; second vice president, John Dee; trustees, John Davidson, Al. E. Welch, John Mark; secretary and treasurer, W. D. Blaicher; delegates to national convention, Joseph R. Blanchette, John Davidson, W. D. Blaicher; alternate, James L. Walker.

Lodge No. 2, Cleveland, O.: President, Art. Hyde; first vice president, P. A. Rivers; second vice president, L. B. Broderick; recording secretary, Ray Belting; treasurer, John N. Kirby; business agent, Wm. Kelly. Delegates to national convention, Art Hyde, John N. Kirby and P. A. Rivers; trustees, E. I. Jenkins, H. T. McAuley; John N. Kirby.

Lodge No. 3, Detroit, Mich.: President, David N. Humphrey; vice president, Wm. Nolan; recording secretary, Ed. Naglevoort; financial secretary, Frank Kenyon; corresponding secretary and treasurer, Albert L. Jones; trustee, five years, W. P. Tindall. Representatives to national convention, Albert L. Jones, Fred W. Robinson, Frank McDonald; alternate, W. H. Dungan.

Lodge No. 5, Baltimore, Md.: President, Wm. Sheffer; vice president, John H. Adams; recording secretary, John H. Mittendorff; corresponding secretary and business manager, James H. Higgins, Sr.; financial secretary, Francis M. Nelson; treasurer, Wm. J. Kane. Representatives to national convention at Washington, Wm. Sheffer, John H. Mittendorff, Wm. J. Kane, Wm. Marshall, Wm. H. Hyman.

Lodge No. 8, Marine City, Mich.; President, S. A. Lyons; first vice president, Hecter Brown; second vice president, Wm. Maxwell; treasurer, James Taylor; secretary, James E. Cottre; chaplain, George A. Shaw; marshal, Richard Tomlin; warden, Wm. Tomlin; sentinel, James Leitch.

Lodge No. 14, Mobile, Ala.: President, L. E. Gager; first vice president, Ed Pearsall; second vice president, E. K. Nelson; financial secretary, James H. Kopf; corresponding secretary and treasurer, Ed Roh; conductor, W. B. Colvin; doorkeeper, T. Lavelle; chaplain, J. McKibbon; representative to national convention, Lee E. Gager.

Lodge No. 17, Cincinnati, O.: President, Albert Johns; vice president, A. P. West; secretary, George S. Collins; treasurer and district deputy, A. Doty; corresponding secretary, George S. Collins.

Lodge No. 20, Memphis, Tenn.: President, John P. Bean; first vice president, George E. Bolen; second vice president, Guy Barnes; secretary, Joe E. Barry; treasurer, John M. Prescott; trustees, J. F. Waldon, Guy Barnes, Louis Botto, Jr. Delegate to grand lodge, J. F. Walden; district deputy, George E. Bolen; business manager, A. D. Coston.

Lodge No. 24, Paducah, Ky.: President, J. H. Mix; vice president, H. C. Warden; recording financial and corresponding secretary, Joe B. Flach; business manager, Joe B. Flach; treasurer, James L. Weston; trustees, Ed. Leatham, W. A. Hutcheson, Charles Johnson; representatives to national convention, Joe B. Flach, Charles M. Johnson.

Lodge No. 27, Bay City, Mich.: President, F. A. Baldwin; vice president, Theodore Lang; recording secretary, Charles Gregory; corresponding secretary, L. C. Schwall; financial secretary, Wm. Rogers; treasurer, Joseph Nold; chaplain, M. McLean; conductor, J. B. Wellman; door keeper, D. L. Jersy; representatives to national convention, N. P. Slater; board of trustees, N. P. Slater, L. C. Schwall, Wm. Sperry.

Lodge No. 35, San Francisco, Cal.: President, James Kane; vice president, J. Albert Reed; second vice president, Thomas D. Bulger; treasurer, Charles C. Elsasser; recording and corresponding secretary, Martin K. Anderson; financial secretary and business manager, John J. Searey; trustees, John Andrews, Charles J. McDonald, John E. A. Miller, Robert Costello, L. J. Reed; delegates to National Convention, Wm. Brady Jr. and Thomas D. Bulger.

Lodge No. 37, Toledo, Ohio: President, J. H. Cunningham; vice president, Allen Coger; treasurer, H D. Fifield; corresponding and financial secretary, John Friener, recording secretary, George Reynolds; chaplain, A. J. Blankley; conductor, Leo Cunningham; door keeper, Joseph Scone.

Lodge No. 38, Seattle, Wash.: President, D. H. Callahan; vice president, Herman Sinbars; second vice president; H. R. Tucker Sr.; corresponding secretary and business manager, C. S. Follett; Recording financial secretary, G. W. Slater; treasurer, H. W. Farmer; trustees, W. A. Snyder, Frank A. Farr, H. E. Thomas; representatives to national convention, C. S. Follett, W. B. Jackling.

Lodge No. 44, Manistee, Mich.: President, Christ. Dahl; vice president, Wm. J. Martin; financial secretary and treasurer, Frank Winkel; corresponding secretary, John Peterson; recording secretary, Louis Hineline; doorkeeper, John Johnson; chaplain, Swan Peterson; representative to National Convention, Christ. Dahl.

Lodge No. 45, Savannah, Ga.: President, W. B. Hills; vice president, Frank Lucree; secretary, Wm. L. Salter; treasurer, H. S. Colding; chaplain, J. E. Johnson; doorkeeper, James Craggs; trustee, Frank Lucree; representatives to national convention, Wm. L. Salter, H. S. Colding.

Lodge No. 47, Sault Ste. Marie, Mich.: President, Norman Raines; vice president, Hiram Wood; recording secretary, John E. McMaster; corresponding secretary, J. R. Cook; financial secretary and treasurer, John Jordan; chaplain, Arthur Adams; conductor, Joseph Boyer; door keeper, Frank Dempster; district deputy, J. R. Cook.

Lodge No. 53, Marine City, Mich.: President, John McNamara; vice president, Wm. Sicken; financial secretary, Frank Oulette; recording secretary, George Love; corresponding secretary, H. Stone; treasurer, H. Stone. Delegates to national convention, A. A. Manion and Wm. McCarren.

Lodge No. 63, Albany, N. Y.: President, M. J. Burke; vice president, J. J. McCarroll; corresponding and recording secretary, Thomas Bayliss; financial secretary, Peter Deitz; treasurer, George Van Allen.

Lodge No. 70, Astoria, Ore.: President, George T. Goodell; vice president, W. J. Mahan; secretary, Frank H. Goodell; treasurer, E. L. Shatto; trustees, F. S. Munson, A. F. Rober, W. J. Mahan.

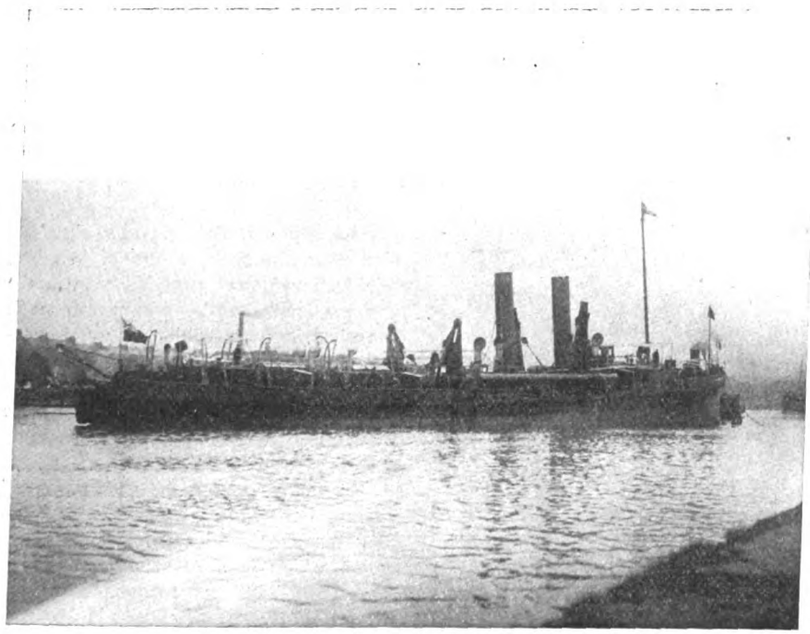
Lodge No. 71, Wilmington, N. C.: President, J. J. Bell; vice president, John W. Fredericks; recording and corresponding secretary, E. D. Warren; financial secretary and treasurer T. H. Hawkins; conductor, J. W. Copeland; chaplain, Andrew Blair; doorkeeper, John M. Barnhill.

Lodge No. 15, New Orleans, La.: President, D. R. Aitken; first vice president, J. Younger; second vice president, F. Mayo; financial secretary, T. C. Bucholtz; secretary and treasurer, N. L. Skinner; delegate to national convention, Harry L. MacPherson.

The Russian gunboat Giliak was recently launched at the admiralty yards at St. Petersburg. She is 218 ft. 4 in. long and 36 ft. 6 in. beam.

THE LATEST BRITISH-BUILT SUCTION DREDGER.

Dec. 19 last, Messrs. William Simons & Co., Ltd., Renfrew, Scotland, who have a world-wide reputation for dredger building, launched a very large and powerful suction and discharging dredger named "Sandpiper," with which the Calcutta Port Commissioners hope to remove the difficulties of navigation on the river Hooghly, India. The dredger, which is 235 ft. in length, has been specially designed for the unique character of the dredging to be done. The hull and machinery are constructed to Lloyds highest class. The propelling and pumping engines are placed in two independent compartments. The propelling power is supplied by two sets of triple-expansion surface-condensing engines, embodying all the latest improvements in marine engine practice, including steam and hydraulic reversing gear. steam turning gear, independent circulating pumps, automatic feed pumps, feed heaters and filters, large evaporators for feed water make-up, and a complete outfit of auxiliary feed and bilge pumps. Steam is generated by four large single-ended horizontal multibular boilers constructed to Lloyds rules for a working pressure of 180 lbs. The collective indicated horsepower of the twin engines is 4,500. The pumping outfit, placed forward of the propelling engines in an independent engine-room consists of two sets of triple-expansion engines, with independent condensing plant and circulating pumps, complete with all modern fittings. The pumps are coupled direct to two centrifugal sand pumps specially designed to raise and discharge altogetner about 30,000 tons of sand and water per hour, the proportion of sand to water being 13 per cent. At Calcutta it is proposed to discharge the material raised by the pumps directly into the river, the fast current of which, it is confidently expected, will convey the spoil to deep water before the sand has had time to settle. This expectation is based on actual experiments from which it has been found that the maximum quantity of sand that fast flowing rivers can carry in suspense is 13 per cent. Each pump is connected to a separate suction pipe, placed one on the port and one on the starboard side of the vessel, each of the pipes being fitted at upper end with a massive swivel bend, which serves as a trunnion or hinge upon which the pipe is free to move, either vertically or horizontally. Large sluice valves are fitted on the suction connections at ship's side, and the suction end of each pipe is fitted with a specially designed nozzle to suit the character of the material to be dredged, while a grid is also fitted to the nozzles to exclude material which might choke or damage the pump. Each section pipe is controlled by two independent derricks, one for each end, and each derrick is worked by steam winches placed on deck, one on each side. These are of most massive construction, having four independent drums arranged to work separately or together as required for lowering, hoisting and derricking the pipes inboard, and they form one of the most important details for the successful working of a dredger of such large dimensions as the "Sandpiper." They are so arranged that one man is capable of manipulating the whole of the movements. The discharge pipes from each sand pump are carried aft under deck, and united into one large discharge pipe of 51 in. diameter, which is shown in one illustration. Special flexible connections are provided to meet the varying conditions between loaded and light draught of the dredger and the floating pipe line. The latter consists of 600 ft. of 51 in. diameter steel piping carried on twelve pontoons, each length of piping being coupled by cast steel joints designed to give flexibility in any direction. One of the outstanding features of the deck equipment of this dredger is the extensive and powerful installation of mooring winches to regulate the movements in the rapid currents of the river Hooghly. A large workshop is fitted under deck, so that general repairs may be effected on board. A special launch is also provided for general service purposes, with special apparatus for lifting and laying moorings. The dredger, with its various dredging accessories has been constructed under the direction of Mr. A. S. Lyster, the engineer-in-chief of the Musez Docks Board, assisted by Messrs. H. H. West & Sons, naval architects, Liverpool.



SUCTION DREDGER SAND PIPER.

F. H. Osborn & Co., marine insurance and average adjusters, 159 La Salle street, Chicago, have issued one of the daintiest calendars of the season. It is a reproduction in colors of one of Philip Boileau's marvellous heads. This artist has during the past three or four years created a distinct field for himself in the portrayal of a refined and well-bred type of woman. F. H. Osborn & Co. have selected his study "Violets," one of his most charming creations. The study is exquisitely drawn and rich in color, purple, as the title would signify, predominating, though well relieved by an ermine collar and rich brown hair.

Mr. Robert S. Riley, who has taken over the control of the American Ship Windlass Co., is making great improvements in its designs and facilities for manufacturing all kinds of marine auxiliaries. Mr. Riley's experience includes a technical training, together with service at sea in the Merchant Marine and United States navy. He is also a director and consulting engineer for the Enterprise Transportation Co., and was formerly connected with the New York Ship Building Co. and William Cramp & Sons Ship & Engine Building Co.

The fifth annual ball of the Marine Engineers' Beneficial Association of Ashtabula, was held at Mason's Dancing Academy at Conneaut on Wednesday evening, Feb. 6. The occasion was a most delightful one.

LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR

At the Naval Architects and Marine Engineers' seventh annual meeting Nov. 16, 1899, Mr. W. I. Babcock, then general manager of the Chicago Ship Building Co., read a paper on "Ships of the Great Lakes," in which he described the work he was doing on the mold system and the amount of same. I had considerable dealings with Mr. Babcock at that time as I was engaged by the owners to look after their interests on vessels building by Mr. Babcock at Chicago.

My dealings with Mr. Babcock were very pleasant and interesting for he was always improving on and simplifying the ancient methods of ship building.

Mr. Babcock was very modest in his paper of that date, for he simply came out as one of the builders on the Great Lakes when he was the only one who had ventured so far on mold work and under the severest criticism from the knowing ones who predicted all kinds of misfortunes ahead of him for daring to cast aside the old methods. At the writing of his paper Mr. Babcock did not favor the laying off of the bilge strakes from the mold loft, but later he did so, and made very good work of same.

The comparing of these articles with Mr. Babcock's paper will show that he was well ahead of the times then.

Mr. Babcock ended his paper by saying, "As a matter of personal opinion, however, after an experience covering the construction of some thirty ships of large size under the mold system, the writer thoroughly believes that this system is the cheapest known and can be applied to a large extent with great advantage in any yard where large ships are built, of any type." Today shows how clearly Mr. Babcock saw ahead of him. Mr. Babcock is one of broadest, brightest and most unselfish men in the business, and he deserves great credit for advancing the mold system and pneumatic tool work on the Great Lakes.

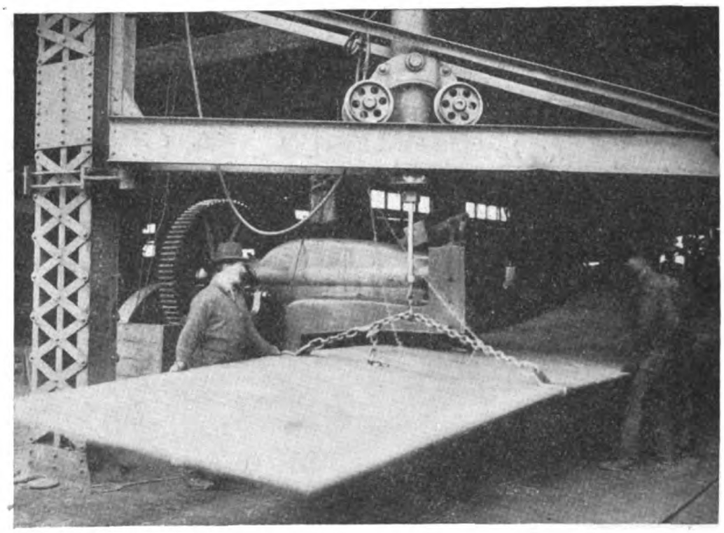


FIG. 147.

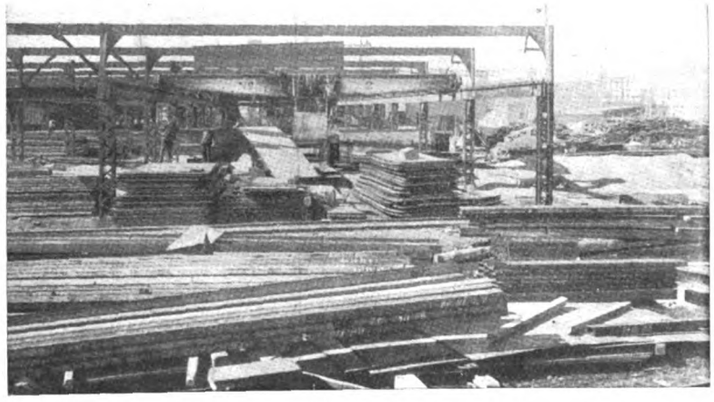


FIG. 146.

ERECTING MATERIAL.

Fig. 146 shows the stock yard, the material is laid out in a way to be easily picked up when needed for marking.

Fig. 147 shows the plate being punched in the punch shop. The crane for handling the plate is clear of the punch machine which is a great advantage over the crane built upon the punch machine. With the greatest of care in building the foundations for punching machines through time the machine gets out of plumb likewise everything attached to it. When the crane droops it is very hard upon the men punching the plates seeing there is always a tendency for the

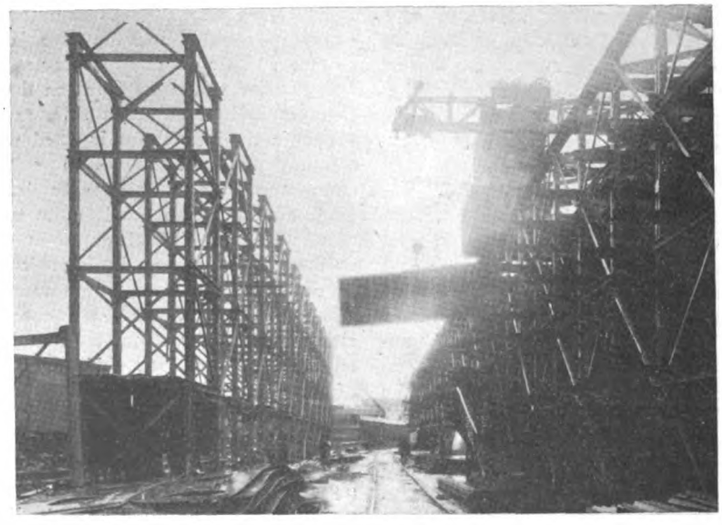


FIG. 148.

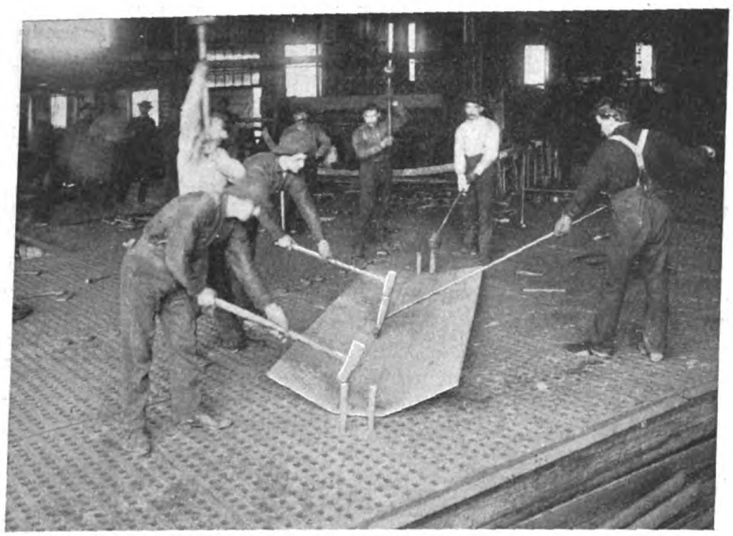


FIG. 149.

plate to slide out of the punch machine. On this crane is a pneumatic hoist which is very easily manipulated and is capable of lifting 5 tons. Fig. 148 shows the plate finished and being hoisted for erection on the ship.

In hoisting this plate it will be noticed that the crane projects out over the staging and is considered the most advantageous crane for ship work. As will be seen that a track runs between the two building berths so that the material can be distributed the whole length of the berths which saves the turning over of material. The material is laid down all along the berths in a way that when it is needed the plates are hoisted right up to place on the ship without any second handling.

The track shown on this Fig. 148 is a sample of what is run all through the ship yard. Turn tables being numerous so that the handling of material by men is almost entirely dispensed with.

Fig. 149 shows the finishing of a keel plate at the furnace. The bending slabs it will be noticed are large and quite smooth for this kind of work.

Oil fuel is used for heating the furnaces with and every appliance of modern ingenuity is on hand to make the work easy for the men on the bending slabs. The work from the furnace is going like clock-work all the year round and compares very favorably with Scotland in cost.

Fig. 150 shows an arch beam being hoisted in place on the ship. This structure as will be seen is riveted with the exception of the frame rivets. The deck plate is riveted to the beams as well as all the brackets connecting the beam and dock together.

Three holes at each side under the deck show slots for two channel stringers and hole for pipes and wires which run along the vessel under the deck.

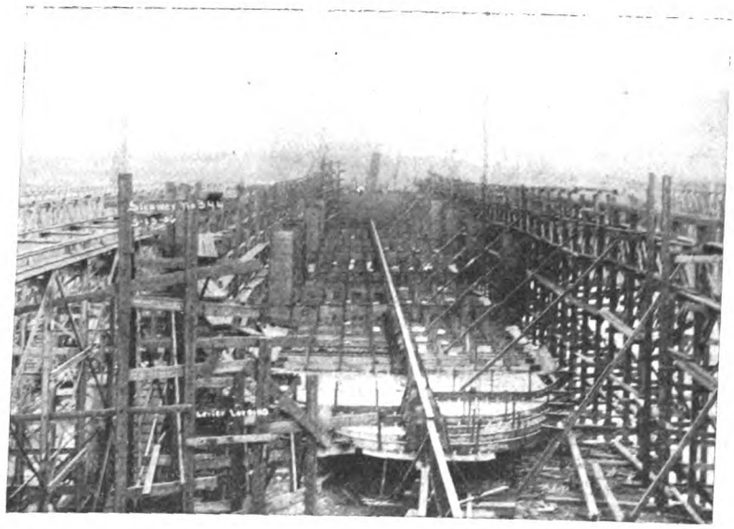


FIG. 151.

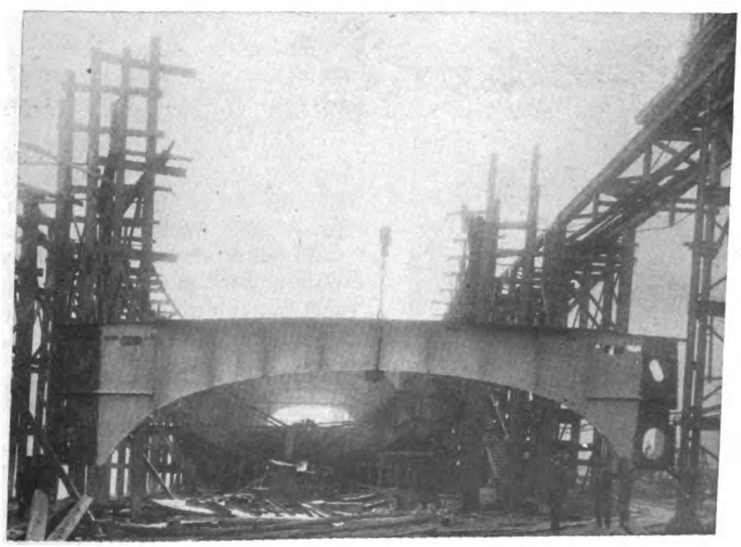


FIG. 150.

As soon as four arch beams are up in place the channels under the beams are drove in place and the other work follows up in rotation.

The erecting of the keel of this vessel was commenced on May 10, 1906, and Fig. 151 shows the amount of work done in three days.

The first thing done after erecting the keel blocks is to put up the keel and bottom shell plating; this forms a staging for the men to stand upon.

The shell plating is supported by shores of scantling size put in anywhere to keep the plating about at its height. The center keelson is next built up and as it is being riveted up the frames in the bottom are placed as well as the deep floors which form the center keelson to the main deck as shown by Fig. 151.

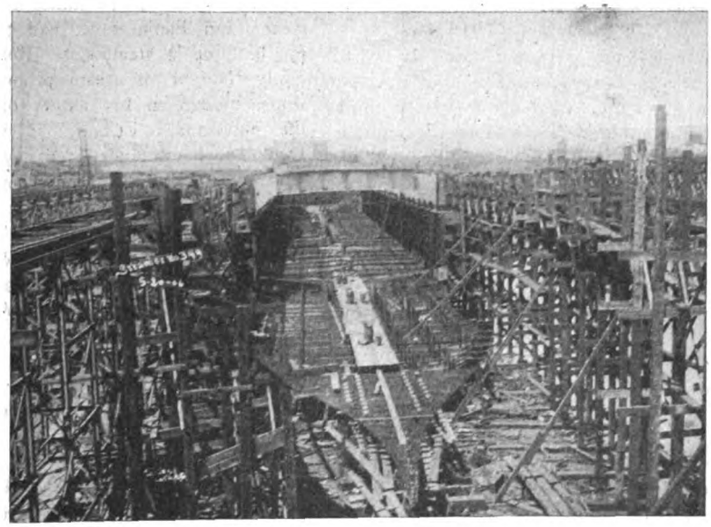


FIG. 152.

Fig. 152 shows the work of erecting a week later. The bottom framing is all in place to the stern post, rider plates are all on as well as the main deck stringer for a considerable length of the vessel midships and quite a number of arch beams.

Fig. 153 shows the work done on May 27, 1906, fifteen working days after they commenced to lay the keel.

Fig. 154 shows the launching June 30, 1906, of the vessel 45 working days after commencing to lay the keel.

BOLTING UP.

This term is not understood in Scotland as it is done on the Great Lakes.

The riveters do the bolting up in Scotland while here a gang of unskilled men are used for that section of the work. A vessel of the size just mentioned would cost in the neighborhood of three thousand dollars for doing this work and completing that class of work throughout.

REAMING.

Reaming is little known in Scotland because when there are any unfair holes the plater has to pay for same and as a rule he makes a deal with the riveter who cuts the hole with tools made for that purpose.

On the Great Lakes men go over all the rivet holes and try rivets of the diameter required in every hole and where the rivet does not enter through all the thicknesses the reaming tool is used to fair up the rivet hole. In cases where the countersink is affected the hole is recountersunk and every care is taken to have the holes fair and ready for the riveters to knock down the rivet.

For reaming all the holes in a vessel of this kind the cost comes close to the bolting up, so that these two items would cost 6,000 dollars which would not be considered in the items of cost on the Scotch-built ship.

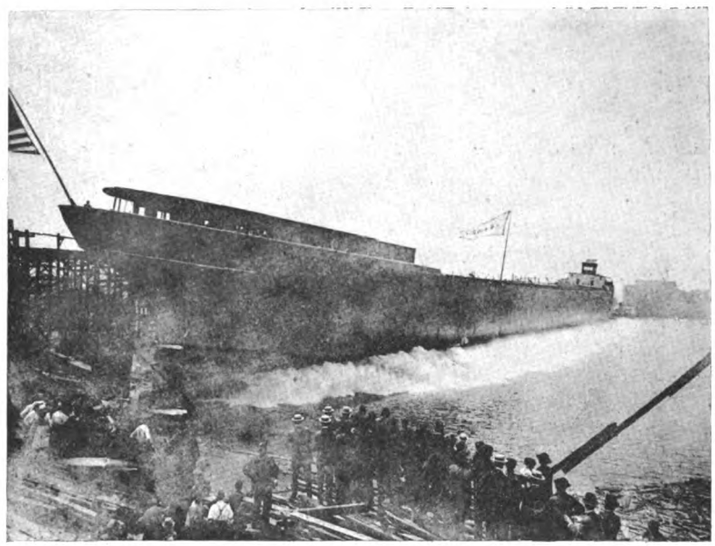


FIG. 154.

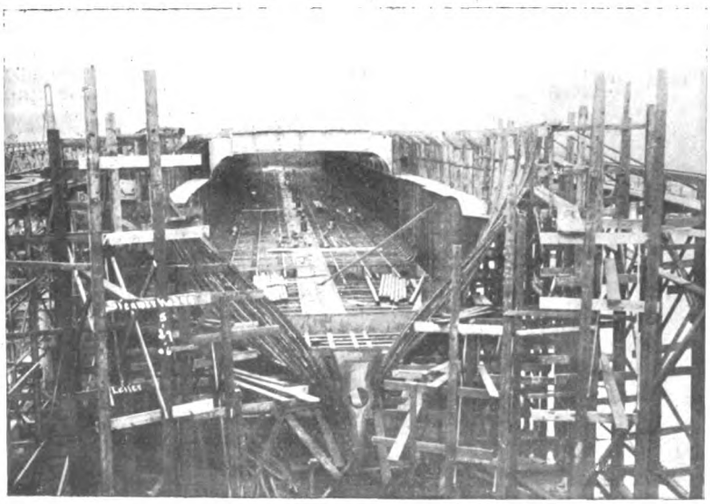


FIG. 153.

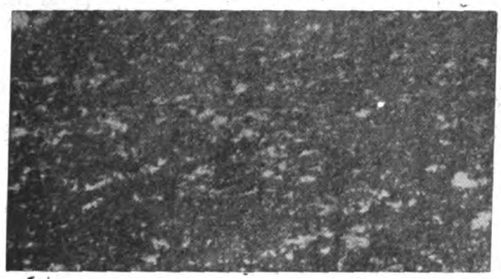
Reaming has always been practiced on the Great Lakes and the cost of same has not been affected through the system of mold work.

The keel plates and bottom plating being as a rule erected first the reaming is all done before the bottom framing is put in place. With the use of pneumatic tools this work is very simple and the class of work as far as rivet holes is all that can be desired.

The steamer Winnebago, belonging to the Iroquois Transportation Co., Thomas Prindiville, managing owner, has been sold to San Francisco interests. With the opening of lake navigation, the steamer will make the voyage to San Francisco, around the horn, under her own steam, and afterwards will be engaged in the lumber trade on the Pacific coast.

EKERT HIGH RESISTANCE PACKING.

The Ekert high resistance valve discs resist all pressures of steam and corresponding heat up to 500 lbs. The body of the Ekert high resistance disc is of such great tenacity that no pressure will hurt it while the practically intact asbestos fibre combined with the selected high resistance patent pore-filling materials close the pores and bodies of the discs to such an extent that any penetrating of



EKERT H. R. ELASTIC PATENT PACKING, GRADE B.

steam is prevented. They will not decompose or crack or in any way deteriorate under any mechanical strain or pressure and will last longer than the valve.

The Ekert high resistance elastic steam packing combines the greatest possible resisting qualities of metal and the elasticity of rubber. It has the qualities of metal in its strength of body, its density and its durability, while it possesses the qualities of rubber in its high degree of elasticity and expansion. Leaks and blow-outs are represented to be impossible where the Ekert packing is used. It is stated that two years of thorough practical test under the most severe conditions obtainable have proved that Ekert packing will resist a steam pressure of 1,000 lbs. and a mechanical pressure of 20,000 lbs., and a superheated steam temperature of 900 degrees Fahr. On account of its tensile strength the Ekert packing never squeezes out, even when tightened with a wrench; neither can it blow out on account of its strong fibrous body. It does not absorb oil, water or other liquid; it does not allow steam or any other fluid to attack or penetrate it. Being highly elastic it swells when getting warm, increasing its resistance through expansion. Joints once packed have never to be looked after. It is indestructible. It is acid and alkali proof. Its main body being asbestos, it is incombustible. When Ekert packing is coated with a mixture of cylinder oil and graphite it will never stick to any surface and can be used over and over again.

RECORD OF AMERICAN AND FOREIGN SHIPPING.

The volume for 1907 of the "Record of American and Foreign Shipping" (American Lloyds), which is the thirty-ninth annual issue of this valuable Register, is now being delivered to subscribers. The Record contains full reports and particulars of about 15,000 vessels, ranging from the infrequent ketch to the full powered trans-Atlantic liner and flying the flag of every nation, alphabetically arranged with much detail as to build, ownership and condition. This information forms the bulk of the annual volume, but it also contains rules for the construction and classification of all classes of vessels with illustrations and tables all of utmost technical and practical value; revised rules for the construction of machinery and boilers, electric installation and refrigerating apparatus on shipboard.

The volume contains names of vessels which have been changed; list of compound names arranged alphabetically by last word of name for ready reference; list of addresses of prominent shipbuilders, dry docks and marine railways of the United States; list of owners of vessels, all of much value to the shipping interests.

The work is approved and indorsed by the important boards of underwriters of the United States and is accepted by the merchants and underwriters throughout the world as a standard classification of shipping. Supplements to the volume issued semi-monthly keep subscribers informed of new vessels constructed during this year; with reports of repairs to old vessels and other useful information.

The new "Record" is published by the American Bureau of Shipping, 66 Beaver street, New York, N. Y.

PAPIN AND THE INVENTION OF STEAMBOATS.

Last summer a fountain was erected in Cassel in honor of Papin, the inventor of the Papin digester and of the steam piston engine, and supposed originator of ship-propulsion by steam. The deity which crowns Papin on a relief-plate of this fountain carries a boat which is fitted with what some newspapers have called a "propeller." In reality it is only intended to represent an oar wheel, and the Papin committee of Cassel was well aware that the famous journey of Papin by a steamboat in 1707, from Cassel to Munster, where the irate fishermen destroyed the boat, is to a certain extent legendary. The boat was propelled by oar wheels, driven by hand, and not by steam, and Papin never had the means for building a steamboat. But he certainly thought of steam propulsion for ships, though in his letters of 1704 to the philosopher Leibnitz, in which he speaks of his intended journey to England by his new boat, he mentions that he would not complicate the construction by putting a steam engine on board. He did not meet with any better support for this project in England than he had obtained in Germany, and he died a poor man in England about 1714. He was born in Blois, France, in 1647, and had, as a Calvinist, emigrated to England, where he met Boyle, and then went to Germany.—*Engineering.*

THE CARMANIA COMPLETES HER FIRST YEAR'S RUNNING.

The Cunard royal mail turbine steamer, Carmania, has completed her first year on the Atlantic service of the company. This has been done without the loss of a single working day, and with a maintenance of the highest expectations which had been held by both builders and owners. The twelve months' voyaging between Liverpool and New York in every condition of weather has been productive of great confidence in the turbine system of propulsion as applied to the great liners of the Cunard company. The vessel has also achieved world-wide fame for her steadiness in the roughest of weather, for the luxury and comfort of the fittings, and the up-to-date methods of catering that has been introduced.

Under the conditions of contract with the builders Messrs. John Brown & Co., Ltd., of Clydebank, the Carmania is now being overhauled, and such alterations and improvements as in the builder's representative's opinion are thought desirable will be made. Experts have traveled each voyage with the liner, and the results of their notes are being acted upon in the overhauling now proceeding. The main point, however, is that calculations based upon the ease with which the Carmania has run 18 knots without being driven will enable her, after certain alterations, to put on at least an additional knot.

The steamer J. H. Bartow, building at the Wyandotte yard of the American Ship Building Co. for the Erie Steamship Co., E. D. Carter, manager, will be launched next Saturday. Capt. A. E. White will sail the new boat. The steamer is named in honor of a prominent Cleveland vessel owner.

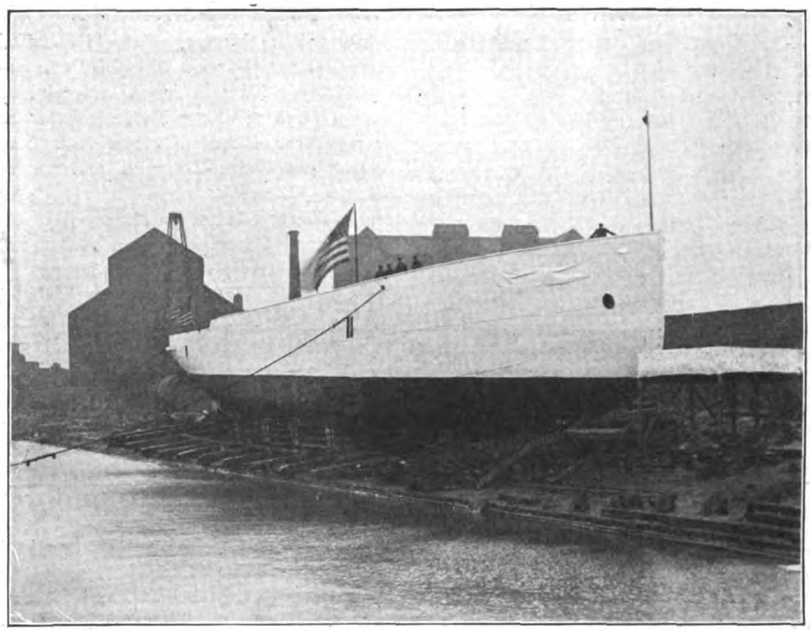
The large dry dock for Tietjen & Lang being built by Henry Cossey, Tottenville, S. I., will be completed about April 1.

WRECKER FAVORITE LAUNCHED.

The wrecking steamer, Favorite, building for the Great Lakes Towing Co., was launched at the Buffalo yard of the American Ship Building Co., on Saturday last, and was christened by Mrs. Edward Smith, wife of the president of the Great Lakes Towing Co., and mother of Edward N. Smith, superintendent of the Buffalo Dry Dock Co.

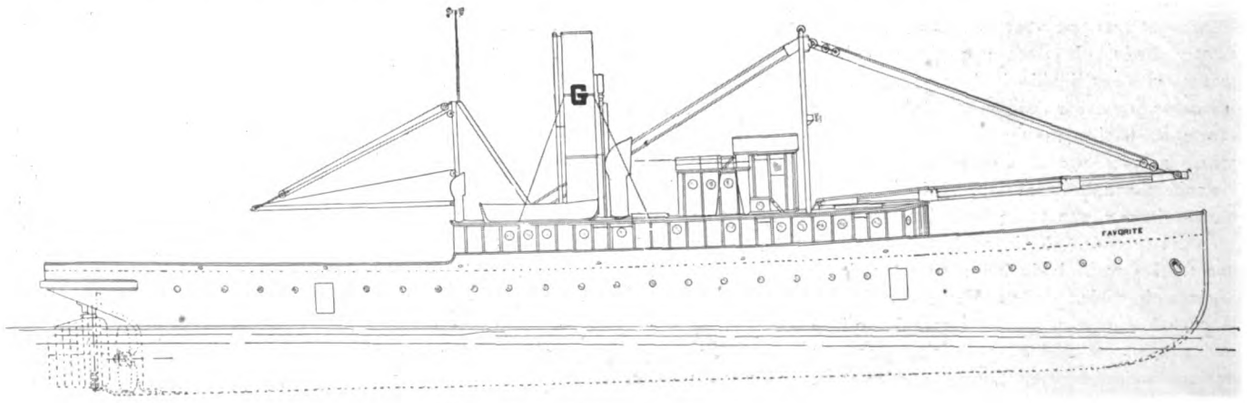
The Favorite was designed by Mr. W. I. Babcock of New York and is the most complete and most powerful wrecking steamer in the world. A large number of vessel owners witnessed the launching, the towing company being represented by Thomas Johnson, assistant to the president, and Secretary M. H. Wardwell. The steamer is 195 ft. over all, 180 ft. between perpendiculars, 43 ft. molded beam, and 19½ ft. molded depth. Her water ballast capacity is 600 tons and her fuel bunkers, which are in the spar deck aft of the pilot house, hold 240 tons of coal. She is built of 20-lb. steel, which is increased forward to ⅝-in. thick backed by angle frames spaced 12 in. apart to receive the impact of ice. She is expected to break almost any ice formation by throwing herself upon the surface by her tremendous power and cutaway of her bow section. The hull is pierced by only two gangways on the side 3 ft. wide and 5 ft. high on hinges. She has no windows whatever except in the pilot-house, the hull and cabin being lighted by deadlights. She is intended to live in any kind of weather and is practically non-sinkable.

Her engine is triple-expansion, 22, 36 and 60 in. diameters by 30-in. stroke, supplied with steam from two Scotch boilers, 15 ft. in diameter and 11½ ft. long, allowed 180 lbs. pressure. Her wrecking equipment is most complete and elaborate. She has a steel A frame derrick forward with 60-ft. steel boom capable of handling a grab bucket with 3 tons of iron ore. She has a 5-ton boom derrick aft for handling plates and material in and out of after hatch and also for raising and lowering her power launch. This power launch, which is an entirely new departure on wreckers, is 30 ft. long and 5 ft. beam, equipped with a 20 H. P. engine, and is intended to be used for running lines to wrecks, etc., in heavy weather. The towing bitts are located 33 per cent of the boat's length forward of her rudder stock. They are built from structural steel and plates up to the towing post table. The table and posts are of cast steel, the table forming a sheave shell for two sheaves of 30 in. diameter for the towing cable. The towing machine is located 30 ft. forward of the towing bitts, while the towing bitts are forward of the main engine. The towing machine is forward of all openings on the deck. It is the largest towing machine that the American Ship Windlass Co. makes, handling 1,800 ft. of 2-in. wire cable.



WRECKER FAVORITE ON THE WAYS JUST PRIOR TO HER LAUNCHING.

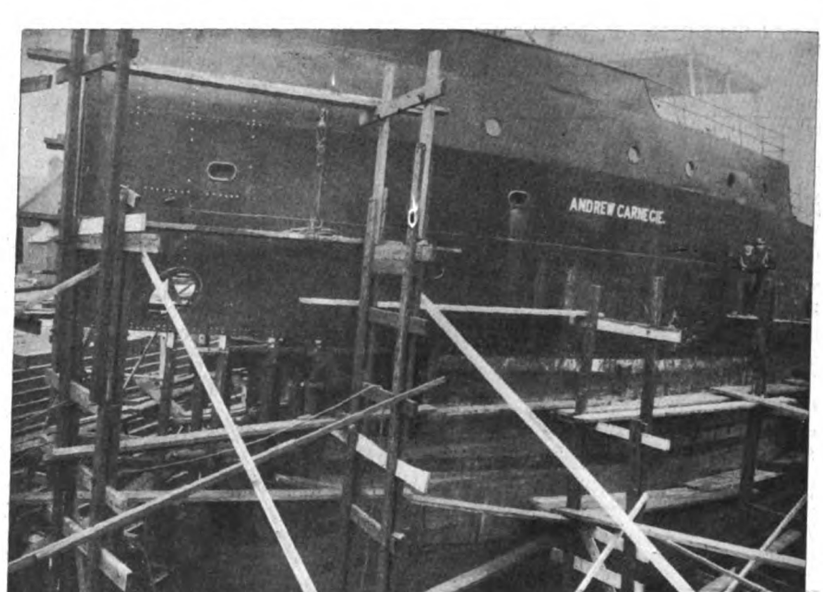
CAPT. ALEX CUNNING.



OUTLINE VIEW OF NEW WRECKER FAVORITE.

The Favorite will really be a floating repair shop. Her machine shop will be equipped with lathe, shaper, pipe cutter, emery wheel, angle shears and punch. Her equipment will enable her to handle plates up to 1 in. thick and to make practically any repairs that strandings and collisions may entail on steamers. As practically the entire hull from main engine aft, including the space forward of collision bulkhead, can be used for water ballast, it is possible to get her deep enough to withstand the heaviest weather. Her air compressor is capable of delivering 500 ft. free air at 100 lbs. pressure per minute and her equipment of pneumatic drills and hammers is very complete. Her electric plant is in duplicate of sufficient size to furnish illumination for the vessel, for her search light and for her electrical tools. Her wrecking pumps and ballast pumps are of great capacity and she carries a complete equipment of portable wrecking tools, portable air compressors and hydraulic jacks. She has 8¾ stud link anchor chains with two 6,000-lb. anchors, and an American Ship Windlass Co. steam windlass for handling them. She has cabin accommodations for 90 men and is without question the most self-contained and resourceful wrecker ever put on the great lakes.

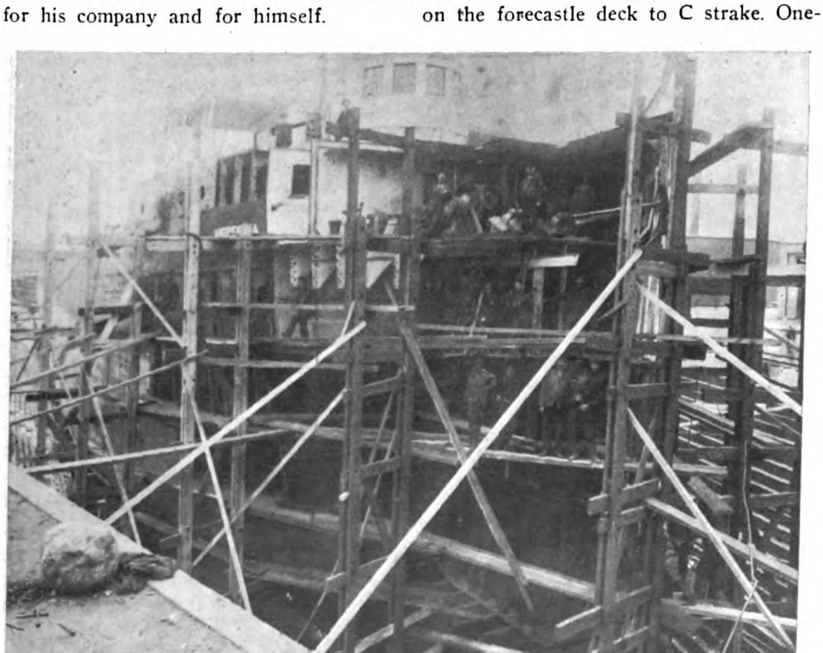
The favorite will be commanded by Capt. Alex Cunning, who achieved the enviable record last year of salving every ship that the Great Lakes Towing Co. sent him after—and many of them were difficult jobs. He certainly made a record for his company and for himself.



PORT BOW OF STEAMER ANDREW CARNEGIE.

REPAIR WORK AT BUFFALO DRY DOCK.

The Buffalo Dry Dock Co. made a record in repairing the steamer Andrew Carnegie, which was in collision with the steamer Nottingham at the dark hole, St. Mary's river, on Oct. 14. Sixty-three plates were taken off and either re-rolled, refurnaced or replaced by new ones. The stem was cut out and refurnaced. A complete new rudder was supplied. The plating on the starboard bow was taken off from the cargo-hold on the forecastle deck to C strake. One-half of the collision bulkhead, forecastle, spar, windlass and chain locker decks were removed into beams. The windlass and chain locker were taken down and hawse pipes taken out. This was a considerable job when it is considered that the frame spacing is 21 in., with a 6-in. channel ice frame between frames. All hold stringers and breast hooks, both port and starboard side, were removed, furnaced and replaced. In short, the whole starboard side of the ship was cut out from center line through keelson to probably 20 ft. aft of collision bulkhead. While the damage on the port side was not so extensive, the impact on the starboard side transmitted across the deck beams, crowding out the port side, necessitating the removal and renewing of plates as shown in the photograph. The Carnegie was repaired in remarkably short time. The steamer left Toledo for Buffalo on Oct. 19, arriving at No. 1 dock of the Buffalo Dry Dock Co. at 9 o'clock the following morning. At 10 o'clock, before the boat was placed in the dock, 89 men were at work cutting out. The pictures were taken eleven days after work was started and just nineteen working days from Oct. 20 the entire work was completed and the boat was loaded and on her way up the lakes. Capt. Dan Buie had charge of the repairs for the owners, acting under Capt. Ed. Morton. The late Capt. McDougall handled the underwriters' side of the case. Great praise is due to these gentlemen for the manner in which they co-operated with the officials of the Buffalo Dry Dock Co., and the excellent results are due in a measure to this friendly spirit.



STARBOARD BOW OF STEAMER ANDREW CARNEGIE.

Two other repair jobs at the Buffalo Dry Dock Co., are worthy of note. The steamer Milwaukee, after her collision with the Mills in the Detroit river, was taken to Buffalo for repairs. Work was started on Sunday morning; twenty-eight plates and a new stem were replaced and the vessel left Buffalo on her way to Lake Superior on the second morning following.

Shortly after this job was completed, probably two weeks before the close of navigation, the steamer Peavey was taken to Buffalo for repairs after grounding three separate times at the Lime Kiln Crossing. She was towed to Buffalo with air compressors aboard to keep her from foundering. Work was started at once by the dry dock people. Seventy-seven plates were removed; considerable center keelson plates and practically all floors damaged between the forepeak and midship section of the vessel were removed, the steamer being floated to her winter berth at the Minnesota ore dock in twenty-one days. Work was done under the supervision of Joseph Hayes, chief engineer of the Peavey Steamship Co., and the late Capt. McDougall for the underwriters.

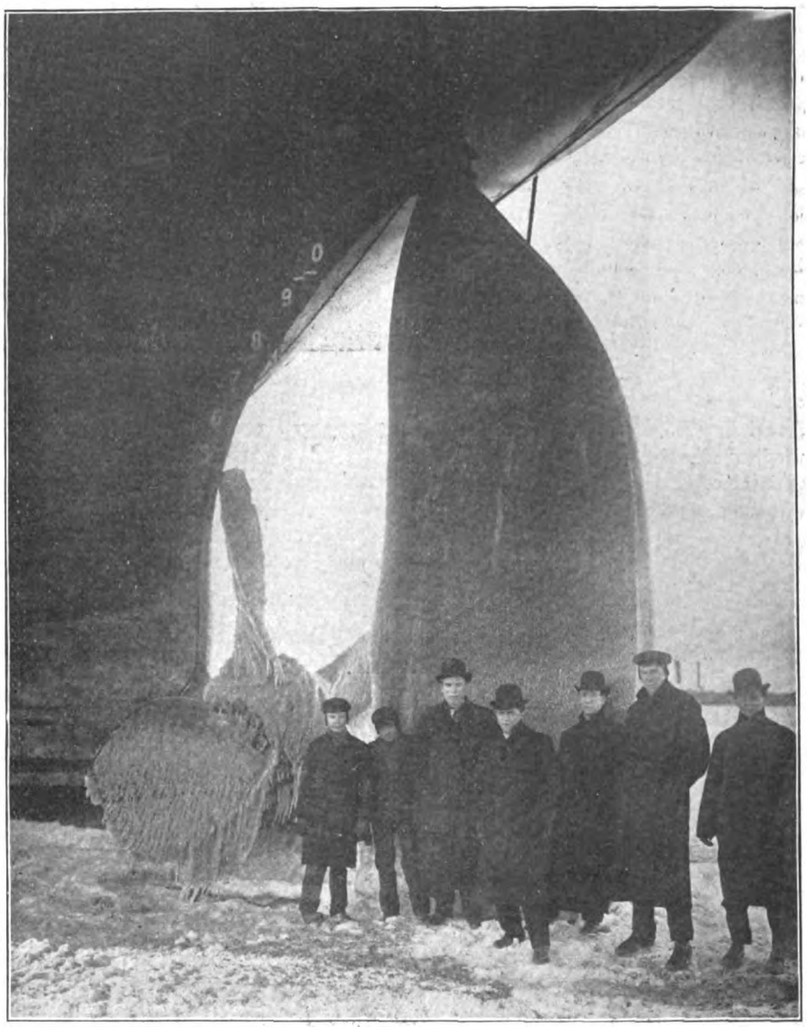
DESCRIPTION OF BUFFALO WIND STORM.

The following letter from the ship keeper of the Senator to Capt. Nesbitt gives a fine description of the recent wind storm at Buffalo:

There is hell here today; there are four boats right here in sight that have blown away from the dock, one down near the shipyard, the ——— at the ore dock, the ——— ahead of us, and another at Electric Elevator. These are what I can see from here, and the firemen say there are lots more. And we also are on the other side of the creek, tied up alongside the George W. Gould. Out at breakwater there is all kinds of trouble; two light boats are up high and dry on the beach, and two loaded boats are up as far as they can get, and the big ——— ——— boat has both anchors down and is running back and forwards something awful, and the other boats are swinging around; there will be lots of damage out there.

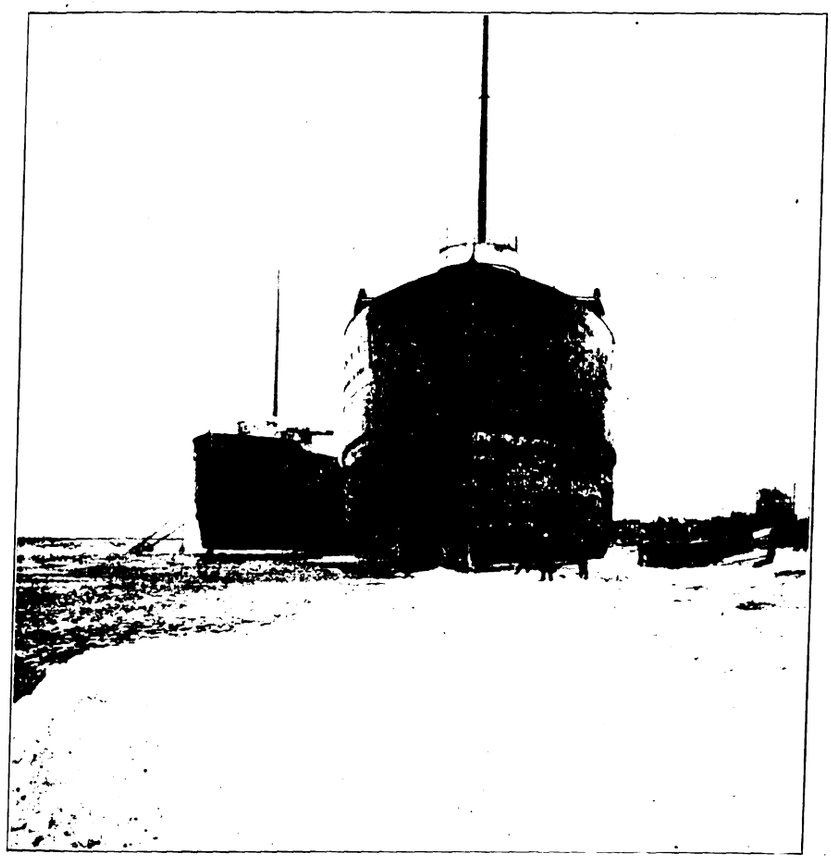
The brick wall on end of Northern Elevator has blown out, so that you can see right into it; nearly the whole end of it is out, and the end of that freight shed alongside the elevator has blown out and the wind is tearing it to pieces.

We did not go to bed until after twelve, and at that time I eased off the forward lines as they have always been tighter than the rest. It was not blowing very hard then, and everything looked all right; shortly after five this morning the lines were cracking, so I got up and was slacking off some more, as the water was level with the top of the dock, and raising all the time, and the wind was blowing a regular hurricane; she was not too tight then under ordinary circumstances, as she was just up against the dock, but the lines were nearly straight up and down she was so high up. Well! the lines and cables went right up over the spiles and away her bow went across the creek. I ran for the forward cables and one parted, but the compressor being not so tight on the other one, I eased her over on it until it went off the drum (you know they were doubled); well, her bow went against the George W. Gould but did not hurt anything, and her stern hung on to the coal dock. I put a line on the Gould and a little later the fire tug came alongside and we ran a line from the bow over to the coal dock, and with the fire tug working against her side and us heaving on her we got her over about twenty feet off the dock, and that was as far as we could get her. I wanted to put out more lines, but the firemen said they could not wait, as they had other boats to get placed. Well, she only stayed there about half an hour, and I could not get any help as I could not get off the boat. She pulled the spile right over, and the line slid off. The water at this time was half way up the spiles, and the firemen that put the line on for us were wading on the dock with high boots on. I was right there when she went, and the only thing I could do was to put a fender in between us and the Gould so I held that round fender in to catch her when she hit but at that she squeezed the Gould's bulwarks in a little right at his chalk, but it is nothing much. I again made her bow fast to the Gould and then the fire tug came back, and the



STERN VIEW OF THE WILLIAM NOTTINGHAM, BEACHED.

harbor master was with him, so he ordered us to ease her stern over to this side and stay here until the wind went down, so I got up the long line down aft and eased her over on that, then took it in and made fast to the Gould.



HURLBURT W. SMITH AND WILLIAM NOTTINGHAM ON THE BEACH.

In the morning I will have to get a gang of men and take her back to the coal dock if it is not blowing so hard. I don't know yet whether I will have to get a tug or not; I will have to get something to run heaving lines. I think we could heave her over if the wind is not too strong. I think I will use all the lines this time, and give them long enough leads so that they won't pull off again, and I guess I had better put chains out also.

The ——— was not ahead of us, as they took her to the elevator Saturday evening.

You will most likely get all the news in the papers tomorrow, and will then see how bad it was; it beats all I have ever seen. The fire chief says it is the worst storm Buffalo ever saw, and if it had not been for the breakwater half the city would have been washed out. Some boat they were working on they said it was all they could do to stand up. Two tugs have been working all day keeping boats in place around the ship yard and lower part of the river. Some big scow has turned over on her side. All the telephone and electric light wires are all down, and there are no lights on any of the streets as far as I can see. The railroad tracks that you walked on were all awash; the waves were rolling right over them.

I think it was a wise move for us to get over on this side, as I don't believe all the lines we could put out would have held her to the dock.

WOODHOUSE CHAINS.

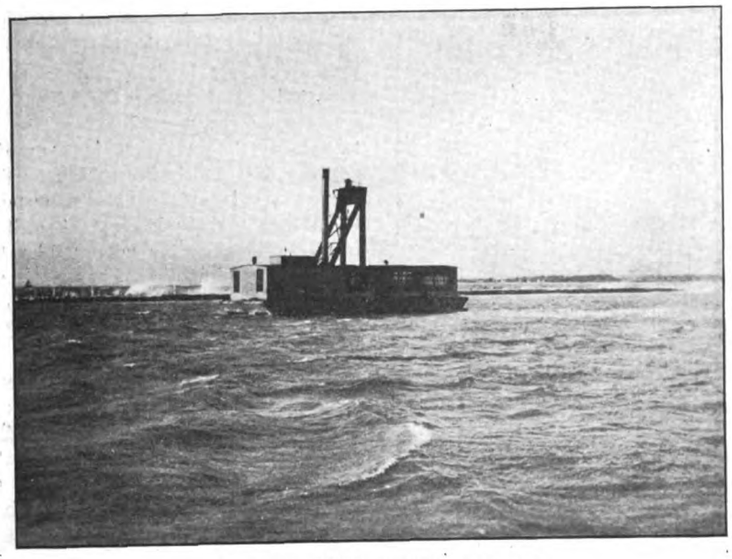
Everyone interested in chains should write to the Woodhouse Chain Co., Trenton, N. J., for a little booklet entitled, "Some Remarks About Woodhouse Chains and Dredger Chains and Ship Cables." Of course, the first consideration in chain-making is the iron. The iron employed in Woodhouse chains is chosen according to the work which the chain has to perform, and is only purchased after exhaustive tests. The Woodhouse BB crane chain is made from high grade refined iron and the BBB crane chains from high grade best refined iron with a breaking strain of 52,000 lbs. per square inch. The iron for the Woodhouse special dredged chain is made solely for that particular chain and is said to be the finest iron procurable. It is especially tough, fibrous to a remarkable degree, and is meant to stand the tremendous strain to which dredger chains are subjected. The Woodhouse sling chains are made from BBB and dredger quality of chain and are usually shipped complete with rings and hooks. Ship cables are made in both close link and stud link of superior quality.

Every workman employed in the factory is constantly under the eyes of an expert. No slipshod working methods are tolerated under any circumstances, and unless a chain is as good as it can be, the company does not consider it as good as it ought to be. The best is none too good because life and property depend upon the chain's strength. Every chain is tested before it leaves the factory. If a link is found to be imperfect the workman who made it is required to insert a perfect one in its place. Since putting in a new link after the chain is made takes a great deal more time than putting it in when the chain is being made, a broken link means direct loss to the man that made it. Moreover the tests take place directly in the shop and no workman likes his fellow-workmen to know that his own particular chain has been found wanting. These two points operate powerfully to make the individual workman particular. Concerning the care of a chain the company very wisely says:

"Of course, a chain will wear like iron, but even iron has its limitations. Recognize these and bestow a little care upon a chain and it will do better work and live longer. For instance: Sometimes through sudden shock or frost the iron will crystallize and lose its fibrous quality; therefore its tensile strength will be lessened. The remedy is annealing. Every chain subject to rapid changes of temperature and shocks should be annealed occasionally. It may be that a chain is subjected to a greater degree of wear in some parts than in others. In such cases, when links become too much worn, they should be taken out and others inserted. No matter how good the rest of the chain is, one weak link reduces the strength of the whole. Chains working over wheels should be greased once in a while so that the ends of the links may secure the best possible bearing and reduce friction. And when such chains are used in hoisting, especially when life depends upon strength, they should be annealed at least once a year, if worked under cover; sometimes oftener, if left out in the open in frosty weather. They should also be kept well oiled. Again, no chain should ever be required to do more than it is intended to do. Every time a chain is subject to a greater strain than its test indicates, it is weakened."

ROCK BREAKER.

The first blow was struck by the Empire Engineering Corporation on their large contract for the government in the Black Rock harbor. This corporation now holds four contracts on the Erie canal improvement, three of which have been in operation for about one year. Mr. Lindon W. Bates, one of our most experienced and successful contracting engineers, is the president of this corporation, and has introduced for use on the Black Rock contract a machine for cutting rock, which will do away with the old method of drilling and blasting, and will in this way save large expense both in time and labor required in this work. The idea and most of the machinery used on these rock cutters comes from Scotland, similar ones have been used with great success in the construction of both the Manchester ship canal and the Suez canal, and also are in use at the present time in South America.



GENERAL VIEW OF ROCK BREAKER.

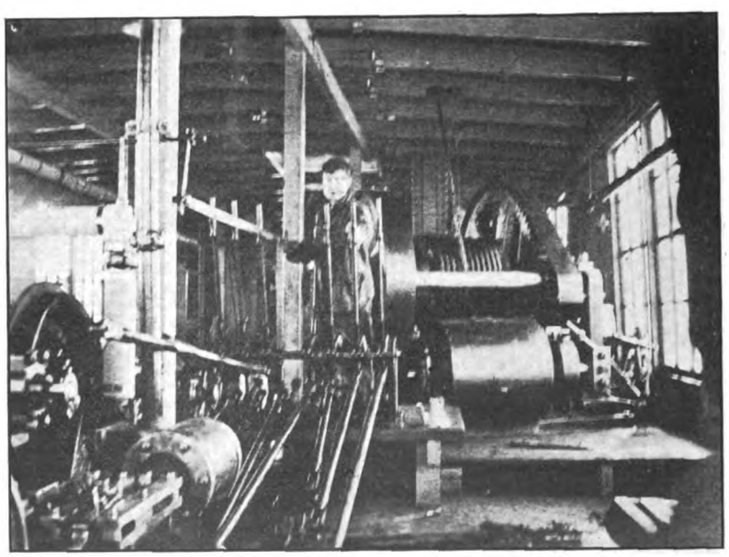
At first glance these cutters look like large floating pile drivers. In brief, these cutters consist of two pontoons 96 ft. long and 17 ft. wide, firmly bound together, in the center of which is left an open space 11 ft. square over which is erected a steel structure reaching 60 ft. above water, from this is suspended a shaft 33 ft. long by 2 ft. in diameter, which has at one end a removable point of high carbon steel secretly tempered, the whole weighing 46,000 lbs. This shaft when dropped from a height of 8 to 10 ft. strikes the rock with tremendous force, shattering it into small pieces which are afterwards easily dredged. The cutter is hoisted and dropped by a patent winch manufactured by Lobnitz & Co., of Renfrew, Scotland.

When the plant is in full operation, which will be early next spring, it will consist of two of these cutters, a four-yd. dipper dredge and two 500 cu. yd. steel scows, with the necessary tugs for handling the fleet. At present the work of construction and operation is under the charge of Mr. F. W. Allen, and it is expected that the work will be completed well within the contract period.

MARINE IRON CO.'S PRODUCT.

The Marine Iron Co. of Bay City, Mich., are building centrifugal pumps of different designs and sizes that are giving the best of satisfaction wherever used. These pumps are used principally for irrigation purposes in emptying dredge cuts, and for pumping out vessels and reservoirs, etc. This company are also extensive builders of dredging machinery for all purposes, having just completed the fourth dredge for the Pittsburg Plate Glass Co., and the fact that the first dredge built for them over four years ago has been in constant operation without a single breakdown to machinery speaks well for the material and workmanship. These dredges are operated both day and night and require the very best material in order to meet the requirements for the work they are engaged in without necessitating delays. The hoisting engines built by this company are from entirely new designs and patterns, and are built in several styles to conform with different requirements, such as deck work, loading or unloading vessels, warping vessels to dock, etc. etc. These engines are built with either friction or solid drums, single or double drums, as may be preferred, and are built in sizes from 4 in. by 6 in. to 8 in. by 8 in. with all working parts finely finished, with cast steel used wherever extra strength is needed. There are several hundred of these machines now in service on the great lakes as well as upon salt water.

The Fairfield Shipbuilding & Engineering Co., Govan, has been awarded contract for the construction of two high-class steamers, 350 ft. by 43 ft. by 27 ft., cargo capacity 2,300 tons, for the Canadian Pacific Railway Co.'s service on the Canadian lakes. The engines will be quadruple-expansion, balanced on the Yarrow, Schlick & Tweedy system. There will be accommodations for 360 passengers.



INTERIOR OF DECK HOUSE, SHOWING WINCHES.

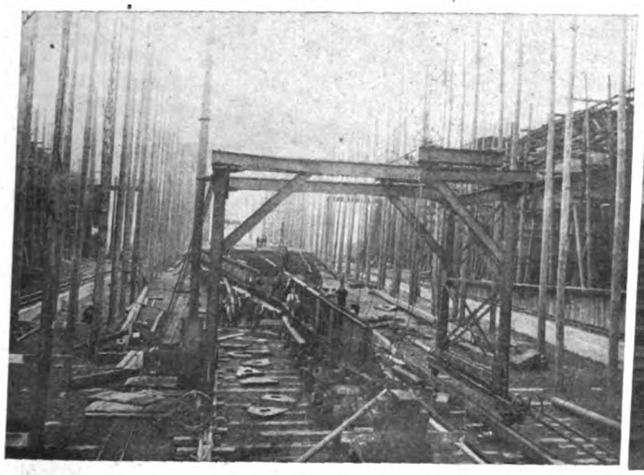
White Star Liner Adriatic.

The steamer Adriatic, building by Harland & Wolff, Belfast, Ireland, for the White Star Line, is the largest vessel to be constructed so far for that fleet. She is 725.9 ft. long, 75.6 ft. beam and 50 ft. deep. Her gross tonnage will be about 25,000 and her displacement will exceed 40,000 tons. The structural views herewith reveal her great strength, which is a noteworthy feature of the vessel besides her size. In addition to the general strength of the structure, the double bottom extending the whole length of the ship is a special element ensuring safety. The double bottom is 5 ft. 1 in. deep, except under the engines, where it is 5 ft. 10 in., to give greater rigidity in the neighborhood of the machinery. The tanks or cells of the double bottom will hold several thousands of tons of water, and the powerful pumps with which the ship will be equipped will enable these spaces to be filled or emptied of water in a very short time.

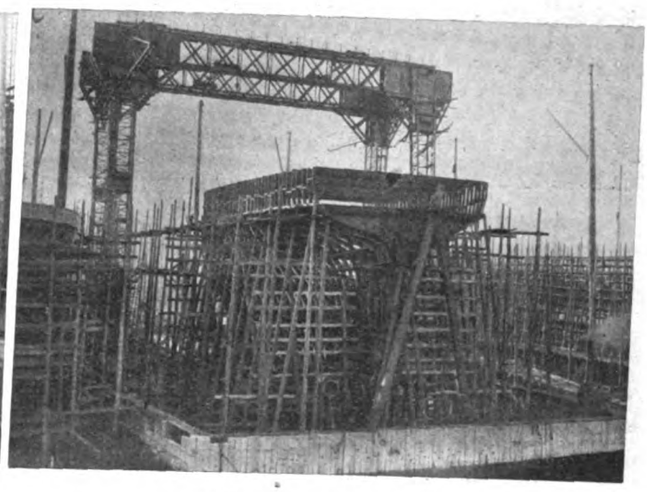
The Adriatic has nine steel decks. Her frames are composed of steel channel bars, and she has eleven watertight bulkheads subdividing the vessel into twelve watertight compartments. Many of the shell plates are over 30 ft. long and 5 ft. wide, and weigh between 3 tons and 4 tons. A large amount of the riveting throughout the hull has been done by hydraulic machines.

The arrangements for cargo will be very complete, there being seven cargo holds, two 'tween deck holds insulated, and two holds fitted as deep tanks. The great feature of the vessel will, however, be the passenger accommodation, for the Adriatic is to be capable of carrying about 3,000 passengers, besides officers, engineers and crew, amounting to about 350.

The general arrangements of the ship will be similar to the Baltic and other vessels of this type, a continuous shade deck running fore and aft, with three tiers of deckhouses and three promenade decks above same. On the upper promenade deck will be situated the first-class lounge, the first-class reading and writing room, and the first-class smoke-room. On the upper bridge deck and the promenade deck are arranged the large deck staterooms, which form such an important feature and are so much admired in the first-class accommodation of the Celtic, Cedric and Baltic, and a further attraction is being provided by

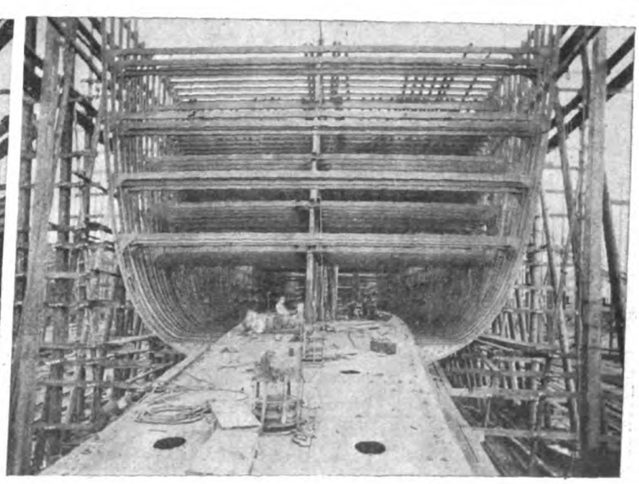


DOUBLE BOTTOM IN COURSE OF CONSTRUCTION.

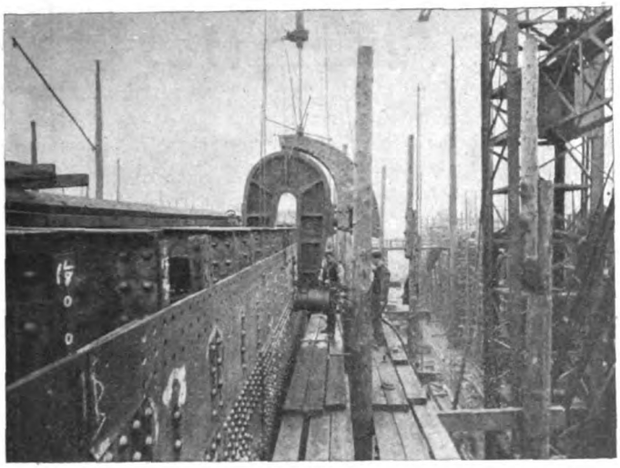


VIEW OF STERN FRAMING.

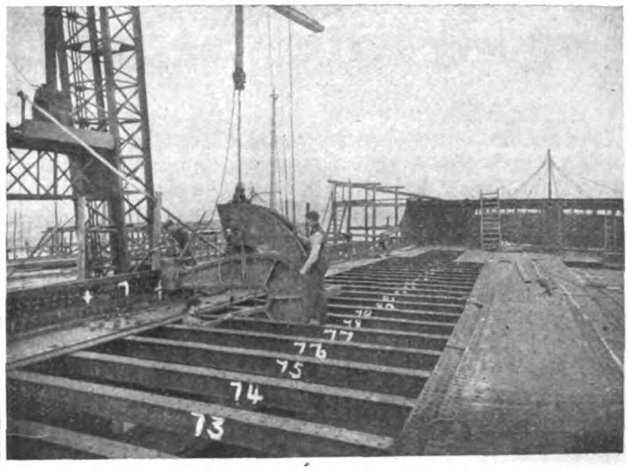
STERN FRAMING SHOWING BOSS FRAMES AND BEAMS.



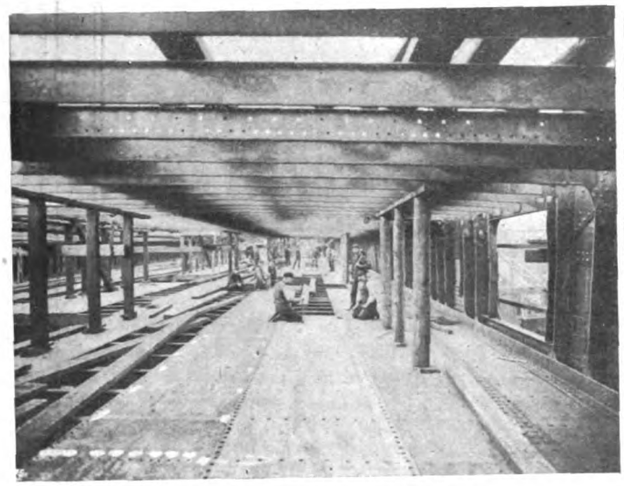
PARTLY FRAMED AND SHOWING TANK TOP PLATING.



HYDRAULIC RIVETER AT WORK ON TOP SIDE PLATING.

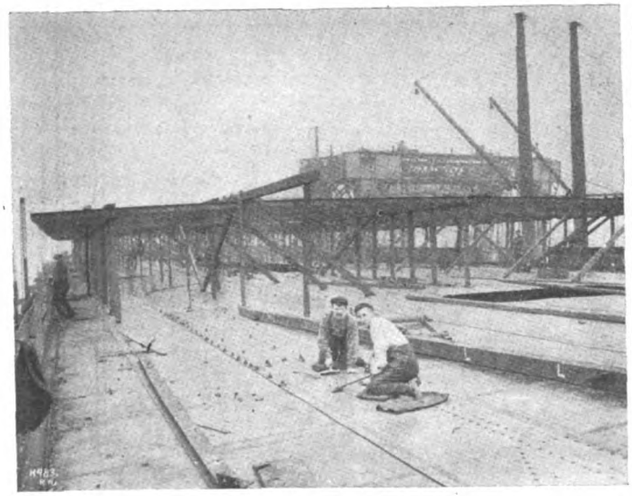


RIVETING UPPER DECK STRINGER BAR BY HYDRAULIC POWER.

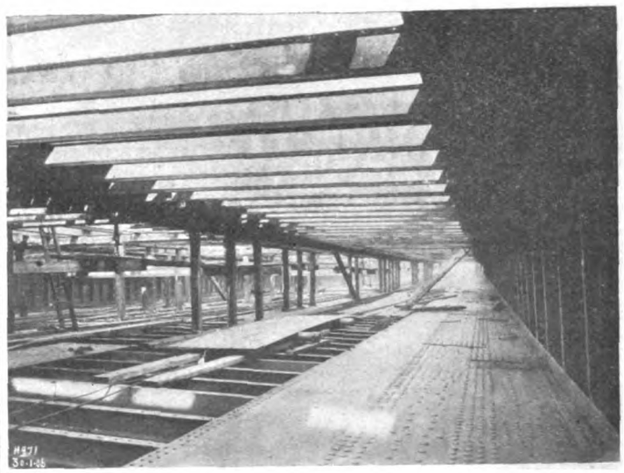


VIEW OF UPPER DECK LOOKING AFT.

PROMENADE DECK WITH GANTRY OVERHEAD.

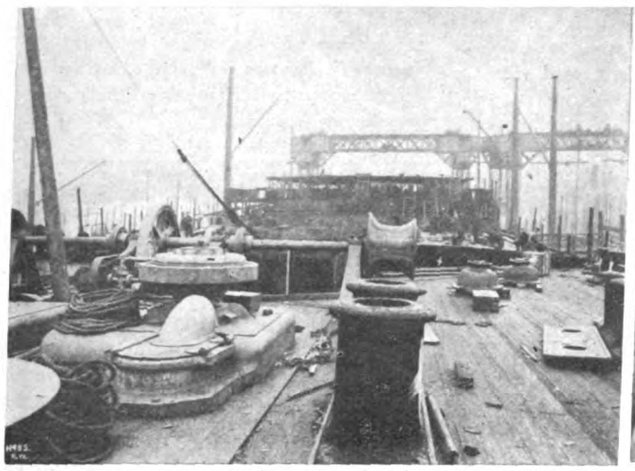


UPPER BRIDGE DECK.

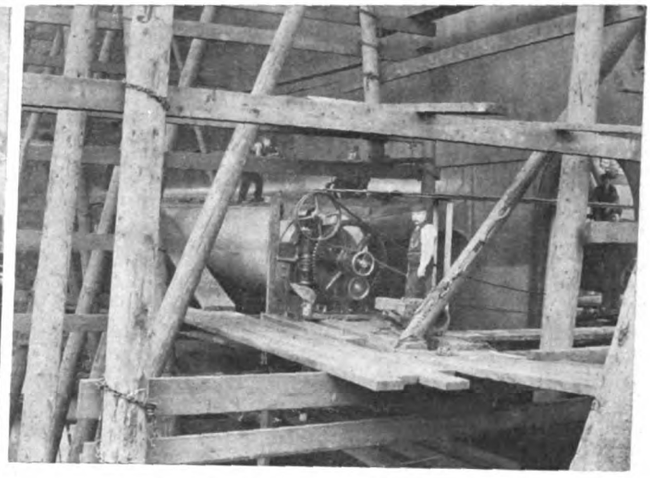


UPPER DECK SHOWING BEAMS OF PROMENADE DECK ABOVE.

a large number of single berth-rooms, which will be appreciated by the traveling public. The first-class dining-salon will be on the upper deck, and all the first-class accommodation will be arranged amidships. Immediately abaft the first-class will be the second-class accommodation, included in which will be a comfortable dining-salon, with 240 seats, smoke-room, and also a ladies' room for this class of passenger. The third-class passengers will be provided for abaft the second class, and to a limited extent at the fore end of the vessel. A great feature in this accommodation will be the

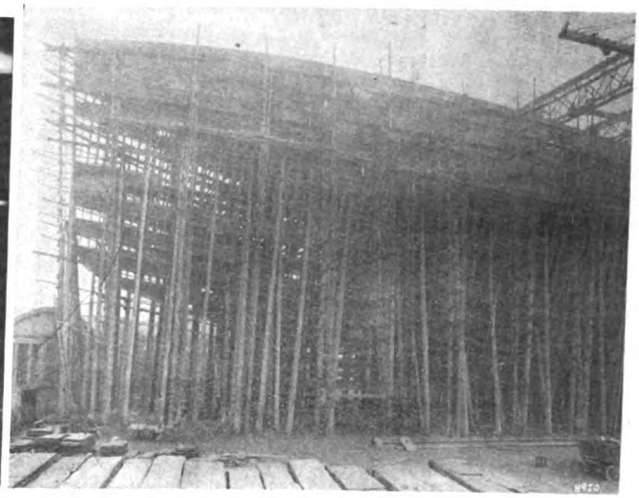


FORECASTLE DECK LOOKING AFT SHOWING BREAKWATER.

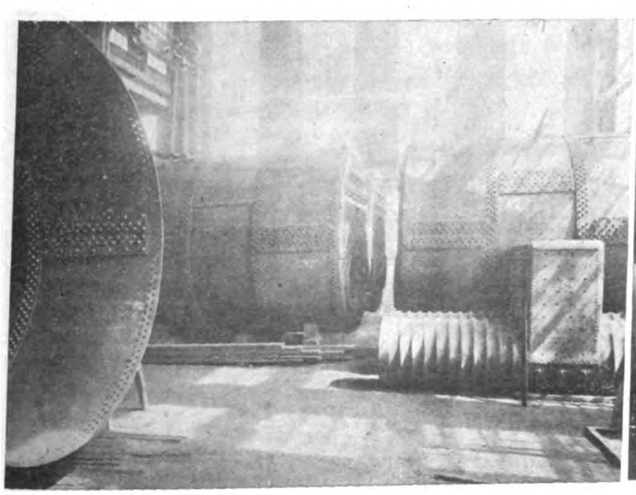


BORING OUT STERN TUBE, PORT SIDE.

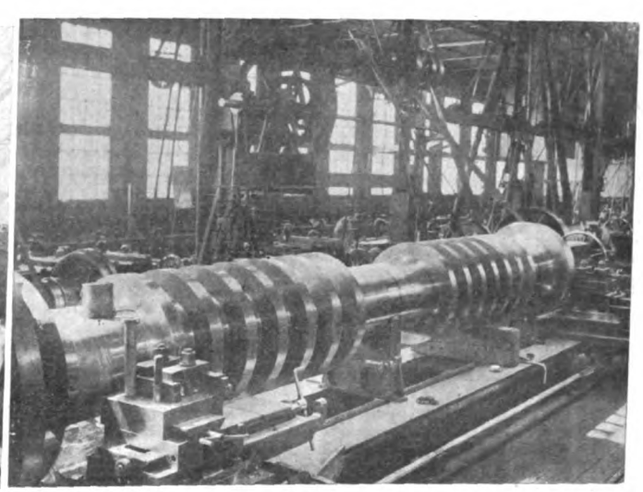
UPPER DECK, INTERNAL IRON WORK IN PREPARATION.



BOW VIEW SHOWING SHELL PLATING AND FRAMES.



BOILERS AND FURNACES, IN BOILER SHOP.



THRUST SHAFT IN ENGINE SHOP.

large number of two, three and four berth rooms, and the commodious and comfortable dining rooms fitted with tables and revolving chairs. The decorations will be of the most striking and artistic kind, and all the appointments handsome and luxurious.

Having such large cargo-carrying capacity, the Adriatic will be fitted with winches and other loading and discharging arrangements of the latest and most efficient type. There will be large refrigerating chambers for the carriage of chilled beef. There will also be an electric winch provided specially for the

rapid and noiseless handling of baggage and stores; and on this ship another novel contrivance will be an electric elevator running from the salon (or upper) deck to the upper promenade deck. A Marconi house with apparatus will be fitted on the upper promenade deck aft, and in addition the ship will be fitted with a submarine signaling apparatus which allows communication through the water at a distance of several miles, whereby in fog the ship can be signaled from lighthouses or dangerous points on the coast, this constituting another important element in the safety of the ship.

BALANCING PROBLEMS.

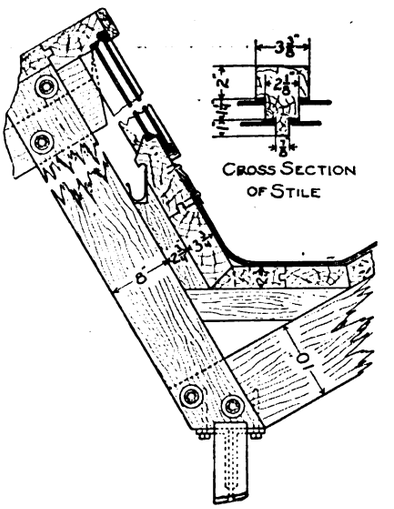
"The Effect and Importance of Balancing in Internal Combustion Motors Applied to Marine Propulsion" was the title of a paper read by Mr. A. T. Weston, M. Sc., Stud. Inst. C. E., recently before the students of the Institution of Civil Engineers. Mr. Weston said that much progress had been made in recent years in the development of high-speed steam engines, more especially in the type of engine adapted to the propulsion of fast vessels, such as torpedo boats and destroyers. His concern was chiefly the usual type of high-speed petrol motor, but the same principles applied to all classes of engines, irrespective of the nature of the combustible element. The application of the petrol motor to marine propulsion opened up a field of development, which, from the point of view of production of power, was unlimited; hence the demand for a motor capable of developing considerable power, and combining all the advantages of motors suitable for automobiles, became universal as soon as the possibilities of the case were fully recognized. The success of the internal-combustion engine as a marine motor depending largely on its fundamental property of producing a large factor of power per ton of machinery, it was desirable that this property be retained in engines of large power; and as the horsepower developed is proportional to speed *caeteris paribus*, this would involve the production of power at a high speed of revolution. While no great difficulty was experienced in running a small multi-cylinder engine in which the reciprocating parts were cut down in weight as much as possible consistent with strength, directly the larger engines were introduced the rapid reciprocation of the heavier masses gave rise to serious difficulties owing to the vibration set up.

In the earlier type of racing vessels in which the peculiar properties of the petrol motor were utilized to their fullest extent, the effect of the vibration was most deleterious on the structure of the hull, and seriously affected the reliability of the engine itself. The cause of the vibration and many similar troubles was not a little obscure. As was well known, to effect a complete absence of vibration in any revolving system, it was essential that all the reciprocating and revolving masses should be in balance as regards inertia forces. But it was at once evident that the usual arrangement of four-cylinder motor engine with cranks at 180 degrees was a system in which the balancing of primary forces and couples was complete. Hence the cause of the vibration appeared more deeply involved than one might have surmised. Mr. Weston then dealt with the mathematical equations for balancing, which were given fully by Herr Schlick in his paper before the Institution of Naval Architects in 1900, and which could be obtained also from Professor Dalby's book on "Balancing." Continuing, Mr. Weston said it might appear that with an engine designed for a low speed of revolution, but at the same time retaining a high piston speed, a good result would be obtained for it; it would be run at a speed so slow that the secondary unbalanced forces might be of no consequence. But there was a well-defined limit to the degree of compression, beyond which it was impossible to go, without incurring the dangers of premature ignition, and therefore a limit to the length of stroke possible, unless the clearance volume was also increased proportionately. Lengthening the stroke also involved a corresponding increase in the length of the cylinder and water jacket, and either of these expedients would require an increase in weight, which was fundamentally objectionable.

From these considerations it would appear that the balanced type of four cylinder engine had every advantage, where a high speed motor using a heavy coil was desirable, such as obtained, for example, in submarine and torpedo-boat work. The arrangement for a six-cylinder engine was equivalent to an imaginary system of three engines with cylinders coincident in the central plane, but with the respective cranks arranged at 120 degrees apart, which system was known to completely satisfy the conditions for complete balancing. The five-cylinder balanced engine was similar to a six-cylinder engine with its two center cylinders and cranks merged into one large cylinder, of double the weight of the reciprocating parts of the other cylinders, in the central plane. A five-cylinder engine arranged in thi way would not give such an even torque as the six-cylinder engine, but in all other respects it would be quite as good. From a knowledge of up-to-date practice it would seem that where space could be allotted for it, and prime cost was of secondary importance, high speed engines of several hundred horsepower capacity would be made of six cylinders. The smoothness of running and complete absence of vibration in such cases as already existed were amongst their most prominent features.

A FIREPROOF FERRYBOAT.

A fireproof ferryboat just completed for the Pennsylvania railroad ferry between Philadelphia and Camden is noteworthy for the use above the main decks of steel plates and structural shapes in place of wooden stanchions, carlines and sheathing. The outside framing consists of double channel window posts with horizontal angle bracing, and the inboard cabin bulkhead is made of heavy angle and I-beam posts, to which is riveted 8-lb. plate sheathing. Each window post consists of two 4-in.

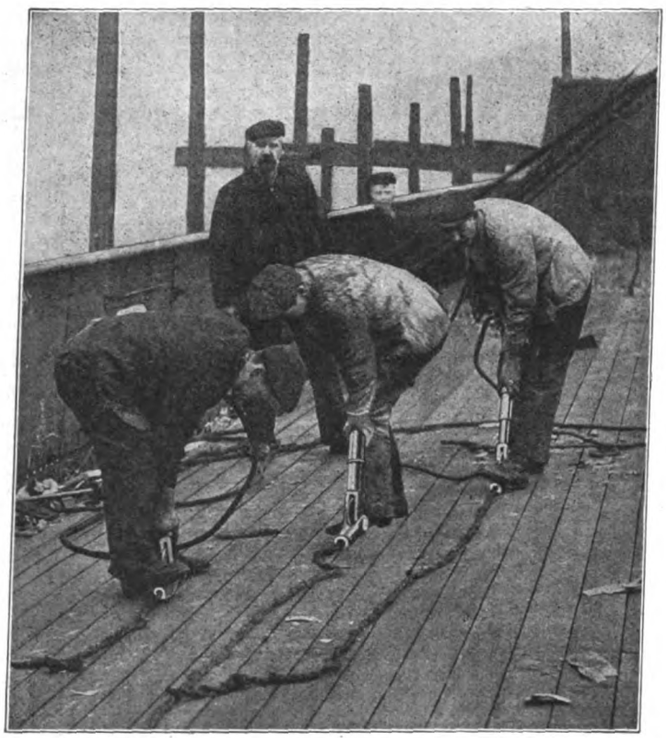


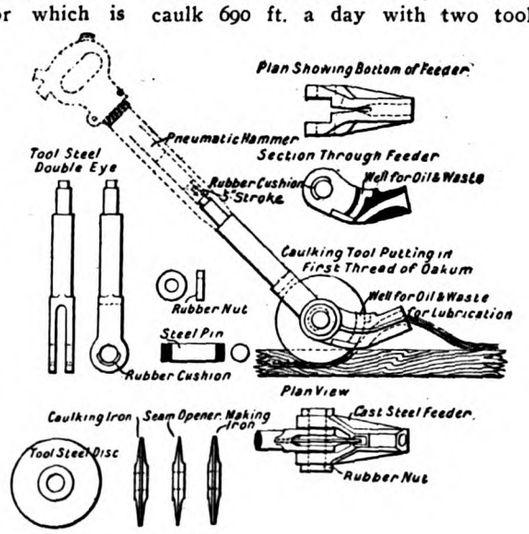
channels with 5-lb. plate covers, to which the window frames are fastened directly. The ornamental interior finish of the cabins consists of panels of asbestos building lumber, which are screwed to small wooden blocks bolted to the inboard bulkhead posts, and finished with drawn-steel mouldings. The seats in the cabin are made of drawn-steel mouldings supported on steel angle-bars. The window sash, window sills and frames are of wood completely covered with sheet copper of No. 18 gage. The pieces of wood forming these parts are first moulded in the section desired, then loosely wrapped with copper, and both together are drawn through dies that press the copper firmly down on the wood and lap-joint the edges of the copper sheet.

The new twin-screw steamer now building at the yard of Harland & Wolff, Belfast, for the Holland-American line, will be named Rotterdam. The vessel is of 23,700 tons register. The Rotterdam will probably be launched late this year and will make her maiden voyage to New York in April, 1908.

A DECK CAULKING TOOL.

The usual method of calking the wooden deck of a ship is by hand. It is expensive as well as laborious, and in recent years has given way, to a considerable extent, to more expeditious methods, which involve the use of machinery. A neat tool for this purpose recently described in the MARINE REVIEW, has been placed on the market. It is known as the Thor pneumatic deck caulking tool, and is constructed by the Independent Pneumatic Tool Co., of Chicago and New York. The accompanying illustration needs little explanation. The apparatus consists essentially of two parts, the feeder and the hammer. The latter is a standard pattern pneumatic hammer, called the Thor which is made by this firm. The feeder is made of cast steel, and is arranged to be fitted to the rest of the apparatus by means of a steel pin, which passes through a double eye-piece, through which the power of the hammer is transmitted. To minimize injury to the bearings owing to the action of the blows, a rubber cushion is placed in each eye-piece and also in each eye of the holder. These can be seen in the drawing. The pin acts as a spindle for the caulking discs, of which there are three kinds. The seam opener is used to open the seam to the required width to receive the oakum. Then the caulking tool is employed to insert the first caulking thread. Finally, two threads of oakum are caulked down on the top of the first thread by means of a third tool, called the maker. The oakum is laid down on the seam in long lengths, and one end threaded through the nose of the feeder, as shown in the illustration. As the feeder is moved along, the oakum is automatically picked up. The machine is capable, so it is claimed, of doing much more work than it is possible to do by hand with ordinary tools—in fact, it is said that two apprentice carpenters can caulk 690 ft. a day with two tools. Further, the firm states that for drumming decks one apprentice can do 900 ft. in one day.





THE HARD-WORKED ENGINEERS' STEWARD.

That the life of the average engineers' steward is like the policeman in the old comic opera—not a happy one—may be gathered from the following description of his duties, which appeared in a London weekly:

The youth who imagines he would like to become a steward in a cargo steamer would do well to note what his duties would be.

In a vessel carrying a chief steward and two assistants he would have to begin as engineers' steward.

The fledgling steward must be up at 4:30 a. m. and scurry away to the galley, where he makes coffee and toast for the engineer on duty. Ditto for himself, which is grateful and comforting on a cold, raw, stormy morning.

Then there is the mess-room deck to scrub, the cabin of the engineer on duty to clean, his bed to make, and his lamp to trim. This done, the breakfast table must be laid for the three—or more—engineers, upon whom the new steward waits while they are at meals.

After their breakfast is over, the donkey-man and steward have breakfast together, and after that there is a washing-up and knife-cleaning that would break the heart of an average scullery maid; for three ship's engineers use more plates, etc., at every meal than a dozen ordinary men.

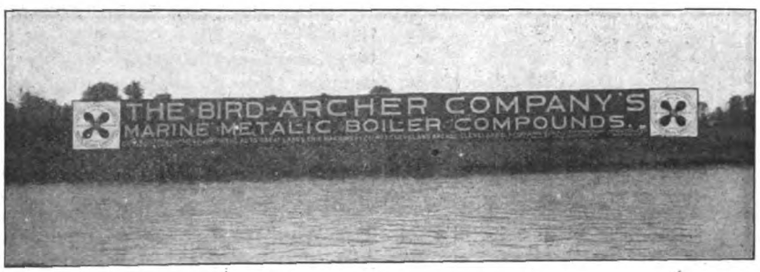
Breakfast over, the other two engineers' cabins must be cleaned.

There is dinner to serve at 1 p. m., afternoon tea at 4, high tea at 6 and supper at 8. And after each meal there is such an array of dirty crockery and knives—often all the more difficult to clean because of the rolling of the ship—that the budding steward generally tires of the sea on the second day of his voyage.

The Harlan & Hollingsworth Corporation, Wilmington, Del., are building a steel lumber steamer for the E. J. Dodge Co., of San Francisco, from designs by Sadler, Perkins & Field, of New York. The schooner which is to be known as St. Helens, is 240 ft. over all, 232-ft. keel, 41-ft. beam and 20 ft. deep. She is built after the lake design with unobstructed hold from forecastle to boiler room. Her engine is triple expansion with cylinders 19, 30 and 50-in. diameters by 36-in. stroke, supplied with steam from two Scotch boilers 12-ft. diameter and 11 ft. 6 in. long.

AN IMPOSING SIGN.

The Bird-Archer Co., 209 Washington St., New York, have erected near the canal, at Sault Ste. Marie, a sign board advertising their boiler compound. This sign is 150 ft. long and 12 ft. high, and is



AN IMPOSING SIGN AT SAULT STE. MARIE.

a mighty conspicuous advertisement. The Bird-Archer Co. has been very successful in introducing their boiler compound on the lakes.

TRADE NOTES.

James L. Robertson & Sons 48 Warren street, New York, have just issued a little folder advertising Eureka packing. They are the makers of seven kinds.

The Sheriffs Mfg. Co., Milwaukee, Wis., has just put out a very serviceable calendar, the kind that the business man likes, one whereon the date may be observed across the room.

The Crandall Packing Co., Palmyra, N. Y., manufacturers of improved steam ammonia and hydraulic packings, recently put out a catalog descriptive of their various makes of packing. It can be had for the asking.

The Billmeyer Lumber Co. of Cumberland, Md., manufacturers and wholesale dealers in white oak car lumber, dock and breaker timber, have just sent to the trade a very serviceable calendar.

The International Oil Engine Co., 38 Murray street, New York, has just issued a catalog descriptive of the International engine. The catalog is very plainly printed and describes the engine, which is of the two cycle type, exhaustively.

The name of the Asbestos & Magnesia Manufacturing Co., of Philadelphia, has been changed to the Ehret Magnesia Manufacturing Co. with Michael Ehret president, and Alvin M. Ehret vice president and treasurer. Mr. George P. Wilson, general manager of the company, has retired.

The Hazard Manufacturing Co., Chicago, Ill., manufacturers of wire rope and insulated wire, has just put out a very serviceable calendar for 1907. The picture is a photograph of a colliery in operation and the almanac is sufficiently large to be read at a considerable distance.

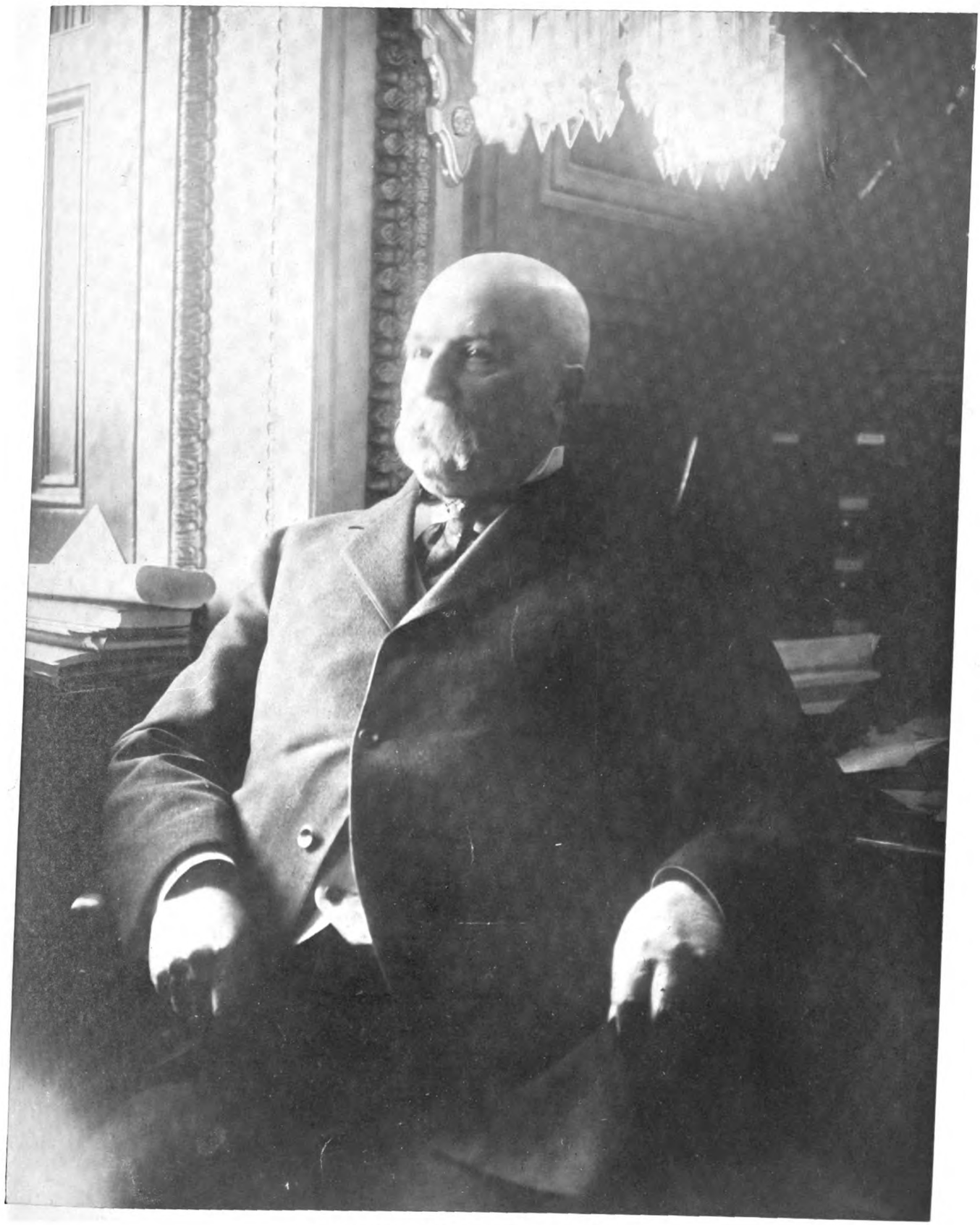
Air Compressor Lubrication is the title of an excellent publication issued by the Joseph Dixon Crucible Co., Jersey City, N. J. Few concerns devote more care to their booklets than this company, and few can be read with greater profit. The book deals with the practice of using graphite for air cylinder lubrication, which is endorsed by leading engineers. The booklet is well printed and well illustrated, and is worth having.

J. W. Atlee, Riverton, N. J., has just issued a circular concerning the Atlee portable cargo batten cleat. The cleats are of various types for angle bulb frames, channel frames, reverse frames and plain angle frames. As no bolts or nuts are required they can be quickly removed and replaced, and are represented to keep the inside of the ship as clean as the outside. The thirty-third vessel is now being equipped with this fitting, including nearly all of the recently-built ships of the following lines: Ward line, Mallory line, Morgan line, Clyde line, Atlantic Transport Co., Philadelphia & Boston Steamship Co., Porto Rico Steamship Co. and the Oceanic Steamship Co.

La Favorite Rubber Manufacturing Co., Patterson, N. J., manufacturers of Perry's specialties, have just put out a catalog descriptive of Perry's packings. The catalog gives complete descriptions of the various makes of Perry packings and is well illustrated throughout. The catalog contains a fine endorsement of the Brown sheet packing by Chief Engineer J. G. Rendall of the steamer City of Erie. This packing was used to pack the steam joints of the steamer preparatory to her race with the steamer Tashmoo, which, as is well known, the City of Erie won. Chief Engineer Rendall says that Perry brown sheet packing held an important part in the trial, as the steamer's success depended to a great extent on the packing used in the steam joints. Chief Rendall adds that this same packing, applied more than three years ago, is still in service and doing good work. The catalog is well designed and of convenient size and will be sent to anyone interested upon request.

The Western Electric Co. 259 South Clinton street, Chicago, have just issued a catalog descriptive of their new 110 acre plant at Hawthorne, Ill. This company hitherto has been principally mentioned with the manufacture of telephone apparatus. Since completion of the Hawthorne works, however, it is in position to build electric power apparatus and switch boards up to and including the largest sixes used for railway purposes. A feature of its new plant is the extraordinary precaution which it has made against interruption of work. For instance, continued uncertainty as to the coal supply has led it to construct two storage bins, one of 4,000 tons and the other of 10,000 tons capacity, both located below the normal ground level. Into these bins coal is supplied directly from the cars and taken out by means of a locomotive crane fitted with a grab bucket. The company is profiting by the tests recently made at Portsmouth by the British admiralty concerning the heating value of coal when left exposed to the air. These tests appear to prove that coal loses nearly 30 per cent of heat value in six weeks if left open to the air. The company accordingly keeps its bins flooded and estimates that the loss is reduced to two per cent. Thorough safeguards have also been taken against fire. In addition to a reservoir a water tower is provided with six steel tanks, with a total capacity of 213,000 gallons, connected with an automatic sprinkler system running to every building except the foundry, forge shop and main body of the machine shop, in which buildings there are absolutely no combustible materials. The plant is equipped throughout with the latest machinery.

The ship building trade in Britain has hardly maintained lately the promise of the earlier months of the year, but some good contracts are now being placed. The most important recent one is for a battleship of the Dreadnaught type, which has been placed with Armstrong, Whitworth & Co., Newcastle. The machinery is to be furnished by the Wallsend Slipway Co. There are two sister ships building in the dock yards, and the engines for these are to be supplied by the Fairfield Co., Glasgow, and Hawthorn, Leslie and Co., Newcastle. The engines are to be delivered within two years, and for any delay beyond that period there will be a penalty of £100 per day. The new battleships are to have a displacement of 18,400 tons, which exceeds that of the first Dreadnaught. The Dreadnaught vessel is to be named the Superb.



SENATOR JACOB H. GALLINGER
OF NEW HAMPSHIRE

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